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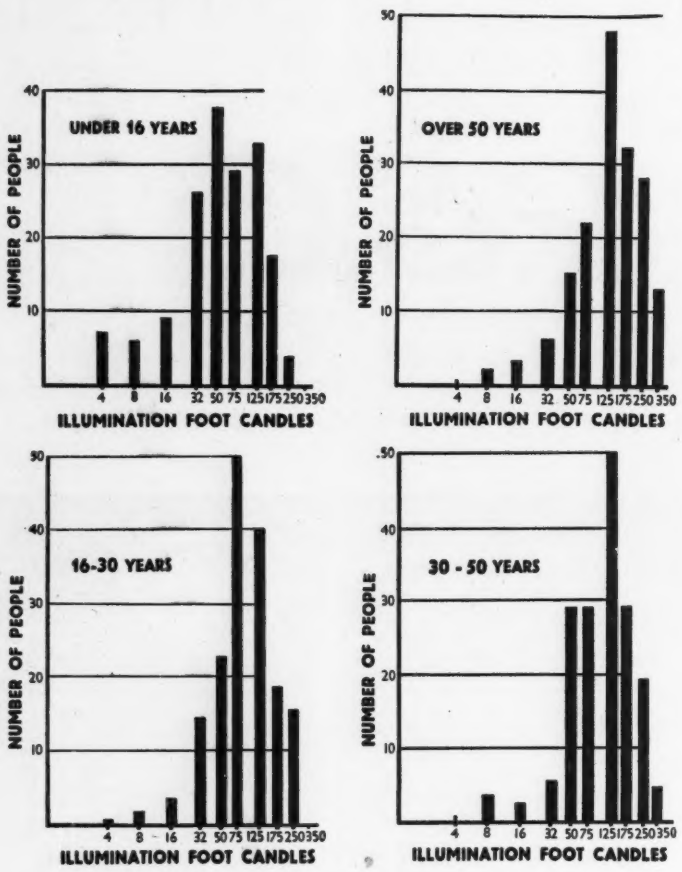
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OVER 50 YEARS
16-30 YEARS
30 - 50 YEARS
NUMBER OF PEOPLE
ILLUMINATION FOOT CANDLES
4 8 16 32 50 75 125 175 250 350
10 20 30 40 50

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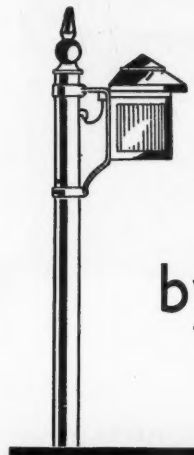

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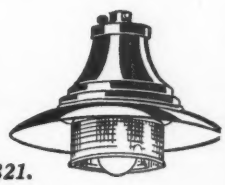

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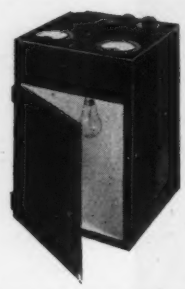

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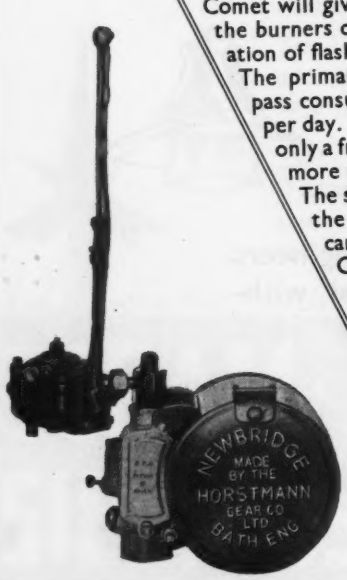

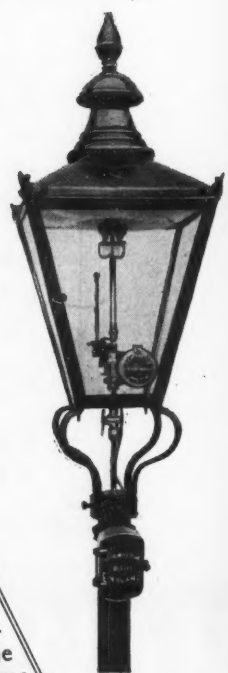

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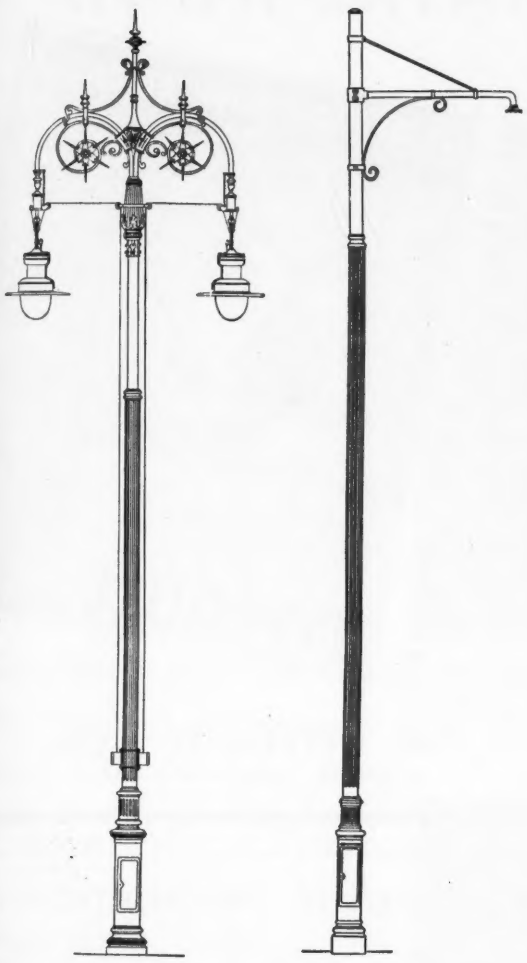

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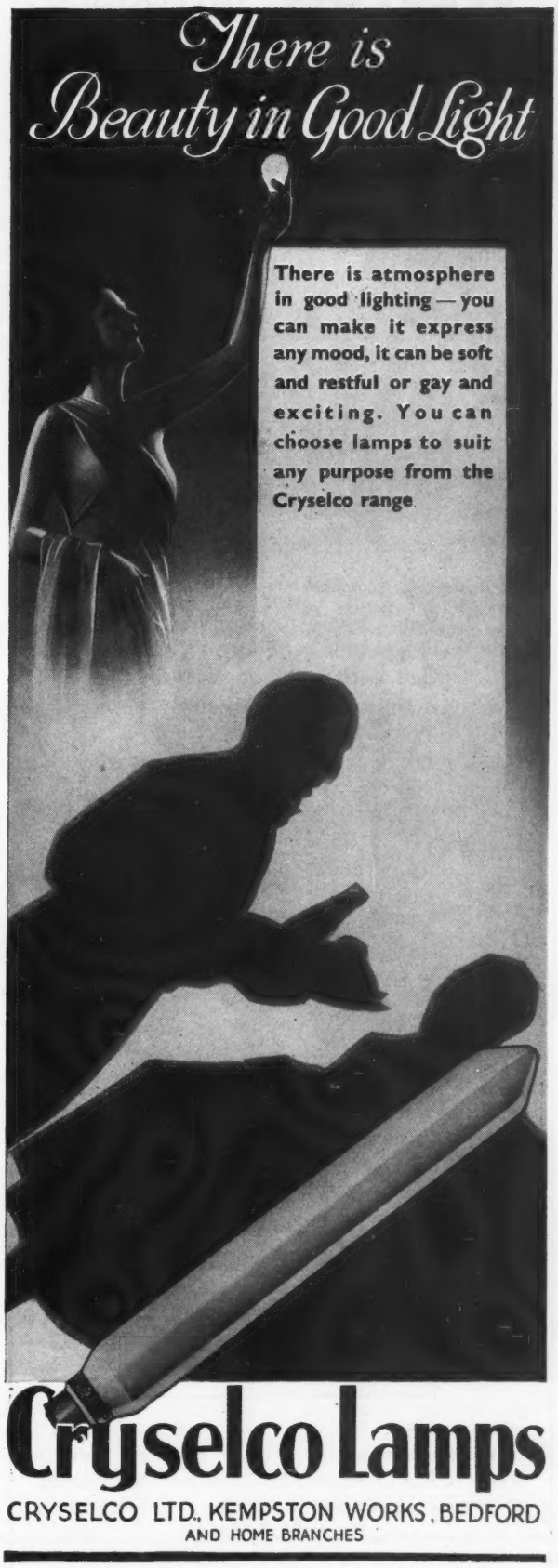
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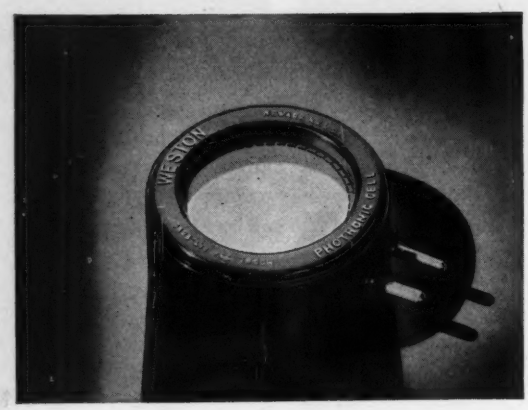

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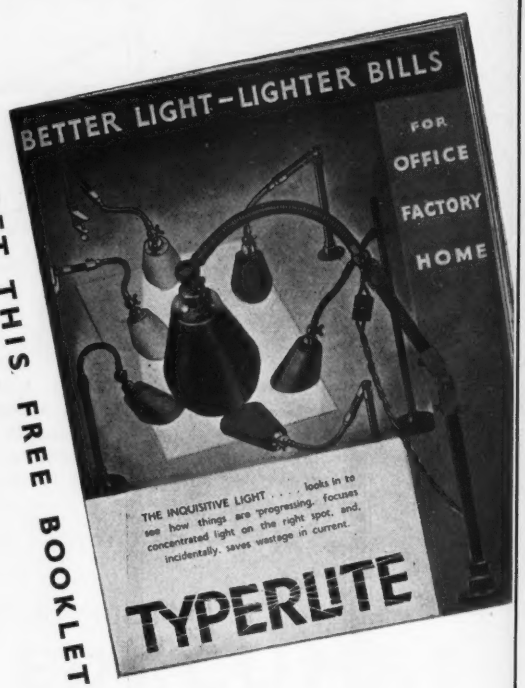
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A survey of recent G.V.D. installations reveals several interesting trends, one of the more noticeable being the extent to which supply undertakings are adopting the System. Far-seeing authorities realize that it is to their interests to educate consumers in the more economical use of light. To this end, a number of Electricity Showrooms in various parts of the country are illuminated by means of G.V.D. units.

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All surrounding lights, with the exception of the four spot lights over the platform, were extinguished when this photograph of the Dundee Corporation Electricity Showroom was taken. Designed to show the possibilities of modern electrical illumination, the showroom has a large G.V.D. laylight of 424 ft. super. At daytime it admits natural light; by night it is illuminated by means of only four lamps, with a total consumption of 1,600 watts. The general effect is very pleasing, and the current consumption remarkably low for a unit of this size.

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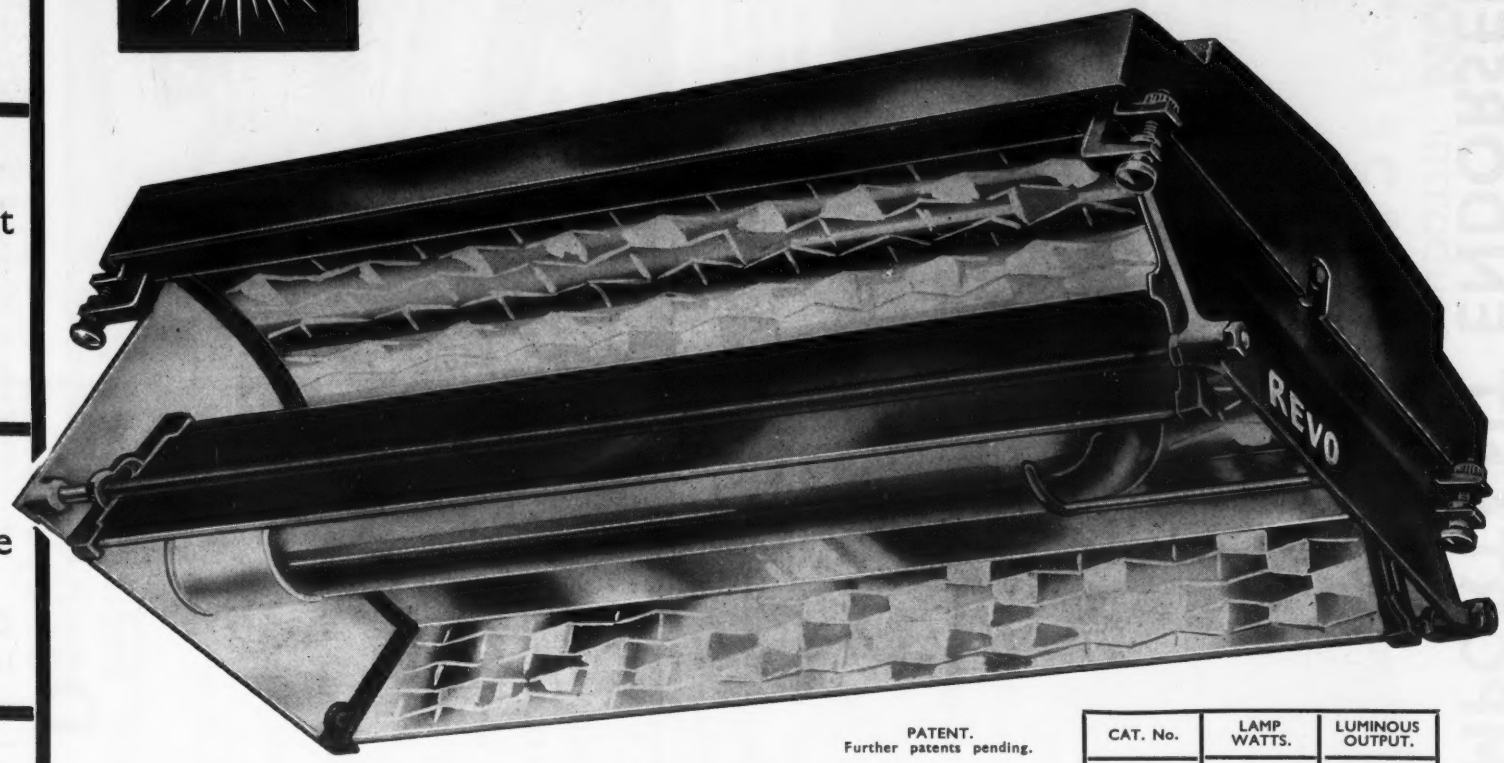

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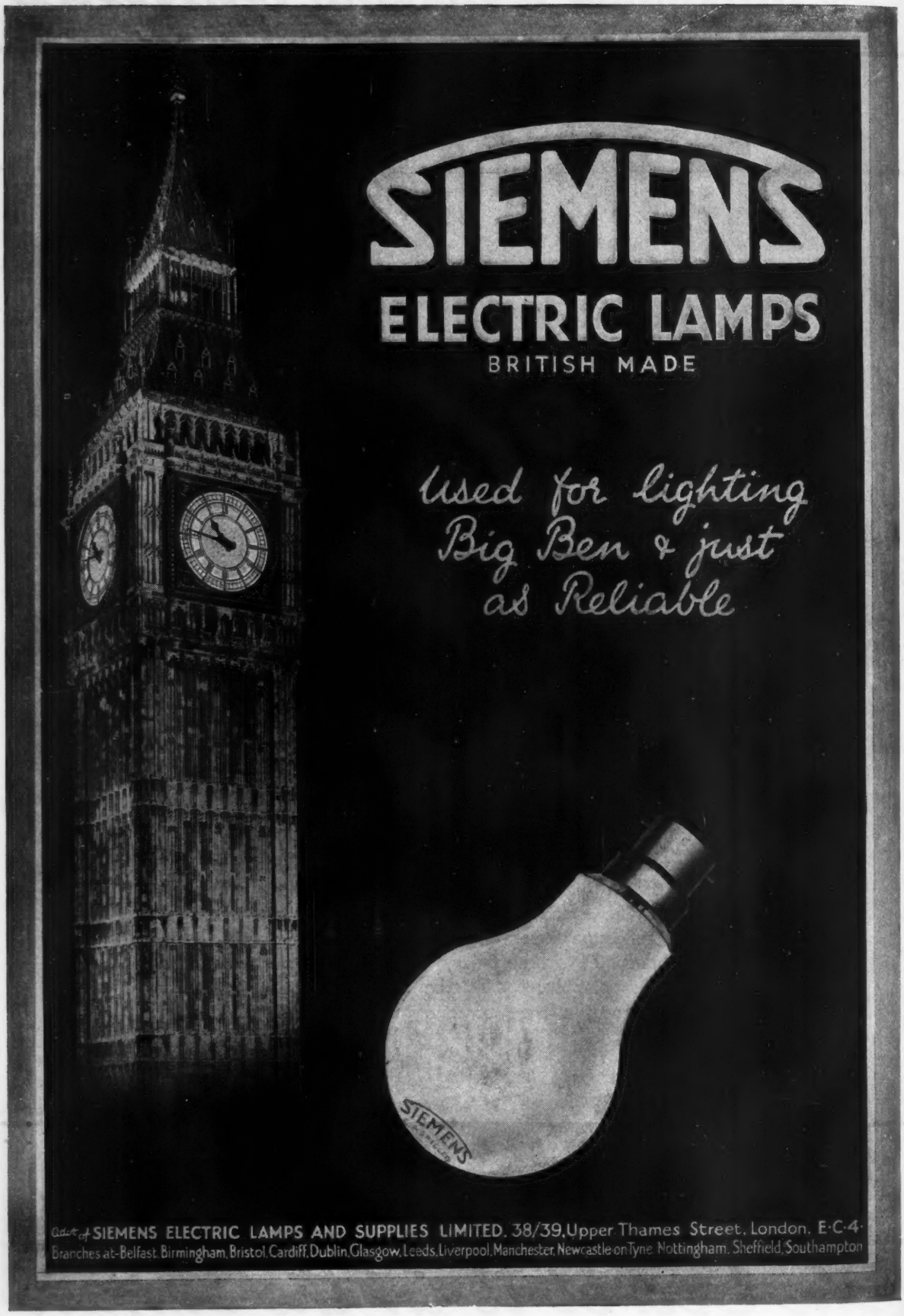
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Light and Lighting

Official Journal of the Illuminating Engineering Society.

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Edited by J. STEWART DOW

Telephone: Victoria 5215

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A Square Deal for the Consumer

TAKE a broad view. Don't be too pedantic in assessing the value of different types of consumers. It will pay you better to aim at simplicity—to make even the humblest consumer believe that he is getting a square deal.

This was the essence of Mr. Cunnington's advice to supply undertakings in his Presidential Address to the Illuminating Engineering Society, in which the drawbacks, from the lighting standpoint, of a multiplicity of methods of charging were pointed out.

We might add two other cautions.

Firstly, if changes in a method of charging are unavoidable, try to ensure that no consumer (and especially no small consumer) is going to be worse off. By all means offer more favourable terms for an increased use of gas or electricity, but do not—if it can be avoided—penalise anyone for using no more than he does at present. A recent controversy, now adjusted by a timely concession on the part of the undertaking concerned, illustrates how quick the public is to resent apparent injustice in such matters as these.

Secondly, whilst it is not a very satisfactory policy to offer a consumer special terms on condition that he uses your system and no other—it is surely inexcusable to threaten existing consumers with worse terms than they enjoy at present unless they abandon completely services by a rival undertaking. Such methods, we may be told, are very exceptional. But it is none the less well to affirm the principle, lest the evil should spread.

The I.E.S. Opening Meeting

The opening meeting of the Illuminating Engineering Society on October 13 was, as usual, a most popular function. Mr. Cunnington's presidential address struck a new note, dealing, as it did, largely with the position of the user of light, who certainly ought to be more fully represented in the Society. His term of office opens under favourable conditions. Let us hope that the Society will make as good progress as it did during the period of his predecessor (Mr. A. W. Beuttell) whose services and likewise those of the retiring Honorary Treasurer (Mr. Percy Good) were gratefully acknowledged. The two presentations this year were to Mr. Ralph Hopkinson and Mr. W. R. Stevens. The former received the Leon Gaster memorial premium for his paper on The Photographic Representation of Street Lighting Installations, the latter the Silver Jubilee Commemoration Award for his experimental work on Thermal Endurance of Illuminating Glassware. The other production presented at the opening meeting, the "Report of Progress," prepared by the Technical Committee was merely laid on the table and will appear in the Transactions in due course.

Progress in Lighting

The series of exhibits, more numerous than ever, showed attractive variety. Naturally electric discharge lamps figured prominently. The new small lamps suitable for use on ordinary lighting circuits and displayed at the opening of the meeting excited much interest and it was instructive to observe what can be done to improve the colour of the light by the aid of fluorescence. There were many special fittings and photometric novelties and several engaging models of lighting installations, such as that showing the lighting of a modern aerodrome. Miscellaneous exhibits covered a wide range—from the new types of lenses sent down from Birmingham by Dr. W. M. Hampton to the amusing bedside lamps (for which Mr. Harold Bright was responsible) which lighted up if inadvertedly struck by a waving arm during a nightmare. A number of the exhibits are to appear again at local meetings in provincial cities. The plan adopted last year of throwing open the exhibit for inspection at 4.30 p.m. was again followed. This opportunity was doubtless appreciated by those who could not stay to the demonstrations afterwards. In two ways the meeting was perhaps a little too successful—in the number of exhibits which involved a somewhat lengthy programme and in the size of the audience which more than filled the available space. Both these points will require consideration next year.

Forthcoming Events.

Nov. 3rd. Address by THE PRESIDENT to the North Local Centre of the Illuminating Engineering Society in Glasgow, followed by **Exhibits.** *(At the Royal Technical College, Glasgow)*; **7.30 p.m.**

Nov. 10th. Mr. E. W. MURRAY on **Factory Lighting and Accident Prevention** *(General Meeting of the Illuminating Engineering Society, at the Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W.1)*; **6.30 p.m.**

Nov. 17th. Visit to Gatwick Aerodrome. *Members of the Illuminating Engineering Society to Gatwick Aerodrome. (Train 3.28 p.m. from Victoria Station).*

Nov. 24th. Mr. J. GUILD on **Colorimetry and its Relation to Photometry** *(Meeting of the Photometric Section of the Illuminating Engineering Society, at the Borough Polytechnic, London, S.E.)*; **6 p.m.**

Dec. 8th. Mr. P. FREEDMAN on **Low Voltage Neon** *(General Meeting of the Illuminating Engineering Society, at the Institution of Mechanical Engineers, Storey's Gate, Westminster, S.W.1)*; **6.30 p.m.**

Fifty Years of Artificial Lighting

An interesting event is taking place in Brussels during November 7-22, namely a gathering at the Salon de la Lumière, Palais Egmont entitled "Quinzaine de la Lumière." There will be a series of conferences dealing with light and vision and more especially with the subject of school lighting, and illustrated by demonstrations. During the period of the conferences important buildings and monuments will be floodlit and there will be agreeable social events. We gather that the support of youth for the cause of good lighting is to be enlisted—there is one conference specially for the benefit of school children and one item on the programme is the "Election de Bébé Lumière." We hope that some British representatives will be able to attend the conference, further particulars of which are available from the Secretary, at 63, Rue Decale, Brussels.

Mr. Cunnington's Presidential Address

Delivered at the Opening Meeting of the Illuminating Engineering Society, on October 13, 1936.

Railway Lighting—Uniformity in Charges and Supply—Maintenance — Attention to Surroundings — Independent Lighting Engineers Needed.

It has happened, very fortunately, during recent years, that each successive president has struck out a new line in his address, and developed special points of view, which have proved very helpful to the Society.

A feature of Mr. Cunnington's remarks was the emphasis placed on several points of evident interest to the consumer, on which, from his experience as lighting engineer to the Southern Railway, he is well qualified to speak. In his opening remarks he drew attention to the many opportunities for the use of light on railways, more especially in connection with the appeal to the eye and the giving of information by means of illuminated time tables, station name-plates, direction signs, etc., and in such special fields as signal lighting, which have been the subject of much development during recent years. An important feature of the position of railways as consumers is that they utilise all kinds of illuminants, including such self-contained systems as paraffin oil, petrol air gas, acetylene, and vaporised paraffin. An interesting table, contrasting conditions in 1911 and 1936, showed the great increase in electric lighting and a corresponding diminution in the number of stations lighted by oil.

Mr. Cunnington next discussed two points of direct interest to the consumer—uniformity in supply and methods of charging. The inconveniences of variations in voltage and in the nature of electric supply to such consumers as railways, who covered a large area, were evident; standardisation of the calorific value of gas in the neighbourhood of 450 to 500 calories per cubic foot would also be helpful. In regard to tariffs, Mr. Cunnington suggested "let the passion for scientific accuracy be tempered with a fair regard for the consumer's point of view." What the consumer wants, above all, is simplicity and uniformity.

The next point emphasised was the desirability of more attention being devoted to maintenance, as compared with efficiency of lighting fittings. Fitting should be viewed more critically in regard to their ultimate appearance. A kindred matter is the consideration of adjacent reflecting surfaces, which have a great deal to do with the appearance of an installation. It would be a service to the lighting industry if, during the period of the Coronation festivities, the owners of large premises in London and elsewhere would have them steam-cleaned—a step which would decidedly lighten the task of floodlighting experts as well as improving the appearance of such buildings during the day time.

In the second portion of his address the president dealt almost entirely with the desirability of making efforts to interest large consumers in the Society's aims and objects and inducing them to employ experts on lighting in connection with the field under their control.

Without minimising the splendid work done by firms engaged in the lighting industry, he urged the need for the broad outlook of the whole lighting world being better represented in the Society, and expressed the hope that there would be advances in the training of all-round lighting engineers to put into practice its ideals. In the realm of public lighting, much had already been done towards getting trained men placed in positions of control—but even now one had still, too frequently, the pathetic spectacle of a lighting committee having to accept figures for a particular system of lighting submitted by a gas or electricity company, because they had no trained and independent expert of their own.

[Photo: Lafayette

MR. ARTHUR CUNNINGTON
President of the Illuminating Engineering Society (1936-1937).

Mr. Cunnington, who is the lighting engineer of the Southern Railway, has been associated with the Society almost from its inception, and has for many years taken an active interest in its affairs.

Public lighting has been in the limelight recently, and it was natural that the need for fully qualified and independent public lighting engineers should be emphasised. But there was also scope for the efforts of such experts on railway systems and by authorities concerned with docks and harbours. (Earlier in his address Mr. Cunnington had remarked that railway companies were amongst the earliest organisations to recognise the value of a lighting engineer to co-ordinate their lighting. The L.N.E.R. had a lighting engineer as far back as 1906, and the Southern Railway followed suit a few years later.) Several of the Government Departments might, with advantage, maintain one or more lighting experts, and the same applied to many industrial organisations and companies holding multiple stores. Where, too, were the consulting lighting engineers?—men of independent outlook fully trained in modern methods of lighting, and capable of assessing the true value of any system offered in relation to the local setting, not merely judging it on a paper efficiency?

Another direction in which development was anticipated was the bringing into the ranks of the Society of more of those engineers connected with the lighting of large stores, factories, and institutions. It was hoped that the new session would see the formation of an Industrial Section, which should prove a helpful step.

A final reference was made to the efforts of the founder of the Society, Mr. L. Gaster, and of other early distinguished members, one of them—Mr. A. P. Trotter—the audience were delighted to find actually present among them that evening!

I.E.S. Informal Meeting

The first informal meeting of the I.E.S. session took place at St. Ermine's Hotel on October 27, when about seventy members and friends assembled to debate the question whether statutory regulations on lighting were a help or a hindrance.

The resolution "That statutory regulations laying down standards of illumination for lighting factories, streets, and public buildings are essential in the interests of progress" was proposed by Mr. R. O. Ackerley, supported by Mr. M. G. Bennett. It was opposed by Mr. A. E. Iliffe and Mr. G. Herbert.

The opening addresses by Mr. Ackerley and Mr. Iliffe were of a particularly spirited character. The latter sprang a surprise on the audience by announcing the arrival of a distinguished visitor, who proved to be a delegate from "far off China," with pigtail and celestial garments complete, who delivered, with a weird sing-song intonation, an address in what was presumably Chinese. The chairman (Mr. F. C. Smith) presented a translation, which commenced with a reference to the Lord of Fire (Lu Men Ratio), and concluded with a dark reference to such enemies of good illumination, who are "like cats who see best at night when the devil Gloom in dark reigneth." (It was only later in the proceedings that the identity of this distinguished visitor—a friend of the Society of very long standing—became apparent.

Mr. Ackerley failed to produce *his* distinguishel visitor—from the Artic regions, but was fortunate in being able to read his address, which concluded with a claim for the recognition of his country as the originator of 'polar curves"!

After these diversions the chairman astutely advised a brief interval in order that members might return to their subject in a more serious frame of mind. On resuming there was an animated discussion in which the following, amongst others, took part: Mr. P. S. Barton, Mr. J. Bateman, Mr. A. W. Beuttell, Mr. A. C. V. Bristol, Mr. W. E. Bush, Mr. A. Cunnington, Mr. E. W. C. Day, Mr. J. S. Dow, Mr. Percy Good, Mr. Howard Long, Major J. Maitland Jones, Mr. C. A. Morton, Mr. E. W. Murray, and Mr. W. R. Stevens. Amongst the speakers were a number of members who have joined the Society quite recently.

As it is clearly understood that the result of such a debate in no way represents the considered view of the Society, it would perhaps be injudicious to state which way the final voting turned. It may be said, however, that the issue was quite a close one.

In conclusion it should be said that Mr. F. C. Smith, who presided, made an excellent chairman.

International Congress on Glass, 1936

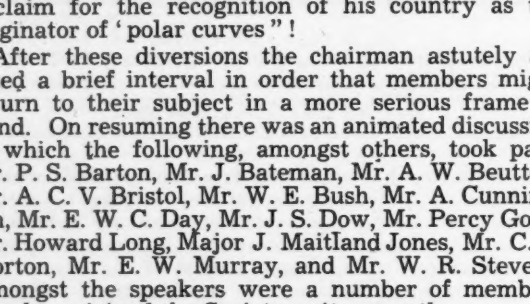
(Communicated)

From July 2 to 11, there met in London and Sheffield, representatives of no less than twenty-two nations to discuss matters of interest in the manufacture and use of glass. The keynote of the Congress was co-operative work for the promotion of scientific, technological and artistic studies in relation to glass. The delegates from overseas joined with their British colleagues in a common desire to extend ever more widely the use of glass based on an intelligent appreciation of its qualities, its usefulness and beauty, and of the beauty it may acquire when worked upon with insight and skill To this end, the work of the Congress was divided into two main sections; one consisted of a series of lectures of general interest, while the other consisted of detailed consideration of selected technical subjects.

Among the lectures of general interest was one of unusual appeal given by Dr. Hostetter, Technical Director of the Corning Glass Company, who dealt with the manufacture of the 200-inch disc of low-expansion glass to be worked into a reflector for the telescope that is being prepared for the California Institute of Technology. Details of the manufacturing and annealing processes were illustrated by a cinema film.

Among the many subjects considered at the technical sessions were: Thermal endurance of glass, its strength and its decoration by surface treatment such as acid finishing and sand-blasting. As an offset to the more serious work of the Congress, visits to glass-works and places of interest were arranged for the overseas delegates, and further opportunities of "mixing" were provided by the social activities which occupied not only the evenings, but in many cases extended well into the early morning hours.

Towards the end of the Congress one frequently heard on the lips of the overseas delegates expressions of appreciation regarding its organisation and the smooth way in which everything worked to schedule, while on the British side, everyone agreed that the Congress had done good work and had been a success from every point of view. For this, credit is largely due to Professor Turner of the Department of Glass Technology, who is President of the International Commission on Glass, and who also acted as general organising secretary of the Congress.



A "Niphan" market lighting installation, showing main feeding sockets fitted to a lamp standard.

MARKET LIGHTING with the NIPHAN System

FOR some years we have been collaborating with public lighting authorities in devising temporary lighting installations for market stalls. The picture shows part of a "NIPHAN" market job, in which 6 sockets, in conjunction with a fuse board, were mounted on a lamp standard, with plugs leading to 3-way tees and suspended through sockets.

● Our extensive market lighting experience is at your disposal.

Announcement of SIMMONDS & STOKES Ltd., 4, Vernon Place, Southampton Row, London, W.C.1. Tel.: Holborn 8637. 'Grams: "Niphon, London."

NIPHAN

Light in Daily Life

(III) The Lighting of the King's Highway

Early History—Light as an Aid to Law and Order—Street Lighting and Accidents—Objects of Street Lighting Technical Difficulties—Comparisons with Natural Light—Drawbacks of Wide Spacing—Reflection from Surroundings—Visibility by Silhouette—The Need for Public Lighting Engineers—Arterial Roads and Rural Highways — Central Supervision Necessary.

If the use of artificial light, in some form or other, has been characteristic of primitive people in remote ages, it is certain that one form of illumination, the systematic lighting of streets, is only of comparatively recent date.

To this field of lighting our previous comment on the tantalisingly small amount of knowledge of ancient practice available applies. The streets of Rome were certainly not lighted, and Juvenal recounts that Roman citizens used to walk the streets at night with lanterns in their belts. Romans of quality were not infrequently accompanied by groups of torchbearers. The task of the linkman seems to have been familiar in quite ancient days.

Beyond a vague reference to the fact that what is now Thames-street was lighted in the days of the Norman kings, one finds little record of very early street lighting in this country. The first communal attempts in this direction are usually considered to date from 1415, when Sir Henry Burton, then Lord Mayor of London, ordered all householders to hang out lanterns in the winter evenings between All Hallows and Candlemass. This method persisted for many years. Even at the beginning of the eighteenth century, when lighting was handled by the ward organisations, these bodies did not themselves provide the lighting, but only exercised supervision over the efforts of private persons. One of the earliest efforts at contracting—really in the circumstances an outstanding one—was that of Edward Heming, who, in 1694, obtained letters patent, giving him the exclusive right of contracting, for a small fee, to place a light opposite every tenth door.

In Paris progress in this direction of common effort seems to have been rather more rapid. Regulations regarding the placing of lamps at stated intervals in the streets were apparently issued as early as 1367, and in 1407 the Prefect of Police ordered the hanging out of lanterns, in the interests of order and safety. In 1666 substantial progress was made by La Reynie, the Lieutenant of Police (it is interesting to note how consistently, in Paris, street lighting was regarded as a function of the police), who is stated to have been responsible for the hanging of 2,726 lanterns. In later days, Lavoisier, the great chemist, and other savants occupied themselves with the problem. Some of these early treatises on the design of lanterns and the distribution of light make interesting reading to-day. It is also curious to see, in old prints, how the modern practice of mounting central lanterns on supports spanning the roadways was adopted.

In London street lighting eventually came within the province of the Commissioners of Sewers. It was only gradually that it came to be regarded as a parochial rather than a personal duty—and it is only to-day that the recognition that this is really a national obligation is gaining ground.

An Aid to Law and Order.

There is one fact that must strike any student of these early days. Whenever any demand for better was put forward it was almost invariably in the interests of order and personal safety—as an aid to the suppression of crime. In France, as we have seen, the Lieutenant of Police was regarded as the natural person to assume the duties of the public lighting engineer. In England efforts to improve public lighting often formed part of a fresh campaign against lawlessness. Old copies of the "Spectator" bear witness to the activities of robbers and gangs of ruffians bearing various fancy names, who seem to have made the lives of citizens a burden. Public lighting, therefore, was regarded primarily as an aid to the suppression of disorder in populous centres, and, for this reason, was scarcely contemplated outside the streets of cities.

When eventually the lighting of main roadways, at least of sections approaching cities, was undertaken, it was not seriously imagined that the road surface could be materially brightened. The lights served merely as beacons to define the limits of the roadway. It was only after the coming of gas and electric lighting, and the accompanying increase in the volume of traffic and the number of vehicles on the roads, that the importance of lighting in relation to traffic became a factor of importance; and only still later when the introduction of the automobile had increased traffic by leaps and bounds and enormously quickened its speed, that considerations of safety of traffic tended to become the dominant factor.

It is surely an ironical result of progress that, having been almost completely successful in eliminating one risk of the road, that of personal assault, we should be preoccupied with a new and much more serious danger—the ever-increasing roll of traffic accidents.

Street Lighting and Accidents.

There is no need to dwell on the serious nature of this problem, which is familiar to everyone. In each single year over 6,000 people are killed and over 200,000 injured on the roads in Great Britain. There have been many statistical reports, which analyse the causes of these accidents. As many as 52 per cent. of those during the winter months occur at night—surely a large proportion when it is recalled that the number of cars and people on the roads during the hours of darkness is still relatively small, and that during certain periods the roads are practically deserted. American investigations have led to

the conclusion that the night hazard is from four to six times the day hazard. Confirmatory evidence as to the effect of darkness is obtainable by a comparison of the number of accidents occurring during certain hours of the day, when there is daylight in midsummer and darkness in mid winter, but the conditions as regards traffic are broadly similar. The number of accidents has been shown to be much greater, in some cases twice as great, during the dark periods.

There can be no question, therefore, of the expediency of improving the lighting of main thoroughfares, especially as the proportion of accidents occurring at night time has tended for some time to increase year by year—a natural consequence of the fact that the roads are now used by night to a much greater extent than in the past. For various reasons it is not very easy to obtain direct proof that improved artificial lighting inevitably leads to fewer accidents. (It might well happen for example that a dark road was shunned by drivers, and then when the lighting was improved the volume and speed of traffic rapidly increased. There might then be an increase in accidents merely because the road was used much more fully than before the change took place.) Nevertheless, records on one 2-mile length of roadway show that improved lighting led to a reduction of 39 per cent. in the night accidents, notwithstanding an 81 per cent. increase in traffic. It has been estimated the cost of road accidents to insurance companies is about £25,000,000 per annum. A saving of 10 per cent. on this item would, in itself, compensate for the cost of, say, 50 per cent. better public lighting, which at present amounts to approximately £5,000,000 per annum.

Objects of Street Lighting.

The functions of street lighting are somewhat complex and depend in some degree on the purpose served by the thoroughfare lighted.

On arterial roads connecting cities, the safety of drivers and pedestrians using the roadway is the main consideration. The illumination of surroundings (frequently trees and fences) scarcely arises, and one of the main objects of early rural lighting—checking the activities of highwaymen—is happily of less importance to-day.

In urban areas traffic conditions are likewise urgent—especially as there are more pedestrians on the roads—but there are other factors. The original aim of street lighting—assistance to the police in preventing crime and disorder—still applies. It used to be said that "one street lamp is as good as three policeman." However this may be the lamp certainly lightens his duties, already sufficiently heavy without the added effect of obscurity. Statistics have been prepared in Germany showing that burglaries, like accidents, are most frequent during the winter months when there is least daylight.

The general appearance of main streets in towns and cities must also be considered. It becomes necessary to allot a larger proportion of the light to the illumination of buildings. One must keep in mind the needs of the citizen who wishes to be able to see the destinations of buses, to distinguish names and numbers on shops and houses, and to recognise acquaintances. One cannot, therefore, be content to concentrate almost all the light on the road surface.

Technical Difficulties.

Difficulties involved in street lighting are partly technical and partly administrative. The former are associated with the means of distributing light to the best advantage, but they are largely also financial difficulties. Almost any technical problem can be solved if sufficient money is available. In this case the lighting expert is never able to approach the conditions he thinks desirable, but only to the best he can with the meagre sums available.

One evident drawback of all artificial lighting in the streets is the very weak intensity as compared with daylight. This was illustrated in a now famous diagram produced by Mr. C. C. Paterson in 1935. On this Mount Everest represented the order of illumination in bright sunshine (8,000 ft.-c.), moderate hills comfortable daylight (700 ft.-c.), and the height of a man the value of natural illumination at dusk (3 ft.-c.), before artificial light is switched on. "Reasonable illumination" in streets (0.2 ft.-c., which is only attained completely in a very few cases) would then be represented by the height of a molehill, but in many of our poorly lighted streets the illumination could only be pictorially represented by the dignified height of a worm cast!

The aspiration of public lighting engineers to secure this "reasonable illumination," does not, therefore, seem in itself a very extravagant one. Such an illumination is only one-fiftieth of the values provided in many offices, shops, and factories almost as a matter of course.

Drawbacks of Wide Spacing.

The defects of street lighting, however, are not confined to weakness of intensity. An equally serious drawback is that, from motives of economy, lamps are necessarily spaced 100 or even 200 ft. or more apart, so that objects receive light from a few directions only, and their shape cannot be clearly revealed. Moreover, when lamps are so far apart as this, the distribution of light between them is very uneven. The minimum illumination on the roadway, for example, may well be only one-fiftieth of the maximum value. In order to get reasonably even distribution of light, it becomes necessary, by means of prisms or reflectors, to concentrate the light from the lamps at angles slightly below the horizontal, so as to illuminate more strongly the point on the roadway midway between two successive lamps. This step, unfortunately, tends to create glare in the eyes of approaching drivers and pedestrians, and the evil is accentuated by the obscurity of the surroundings.

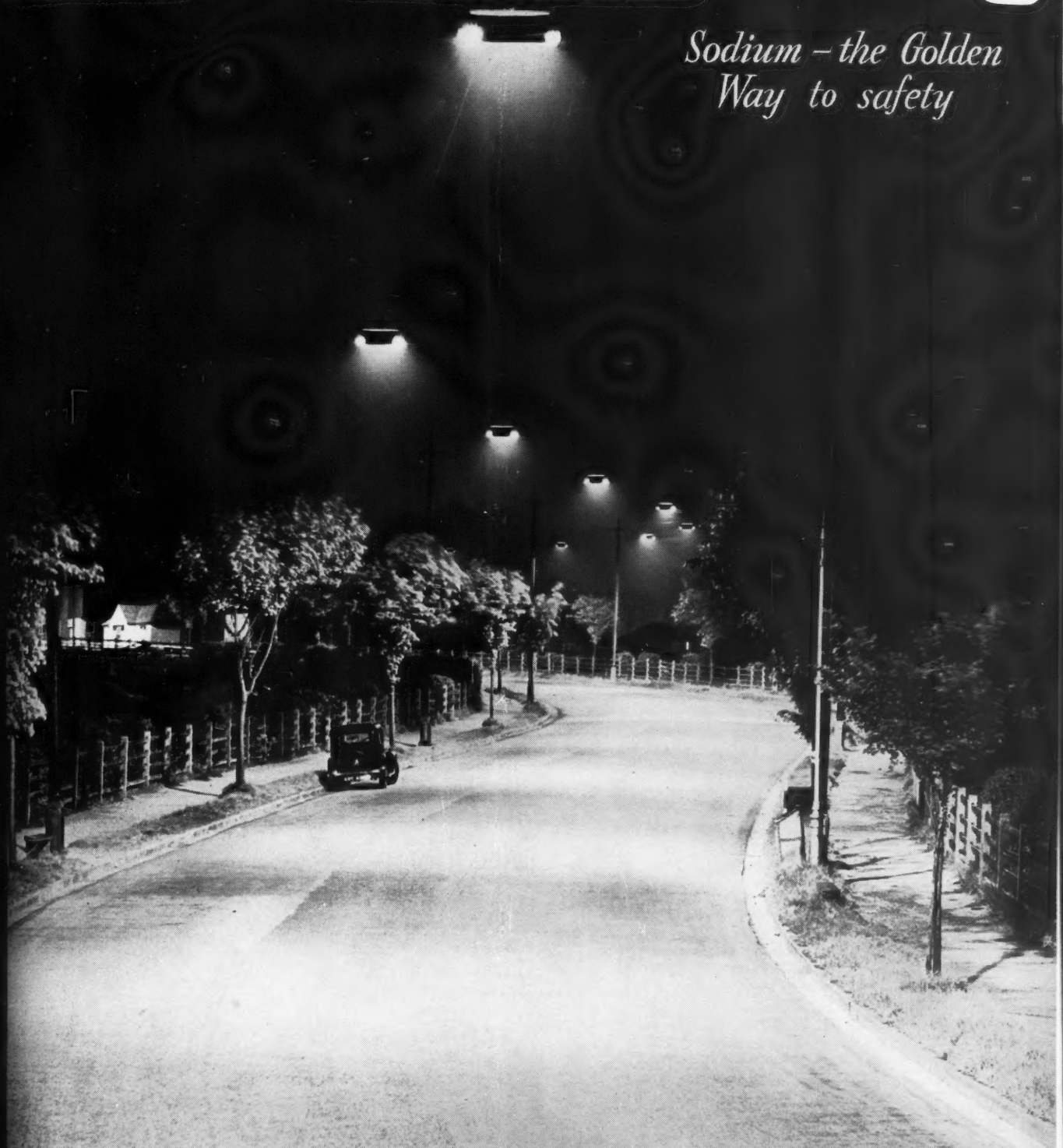
Reflection from Surroundings.

All these conditions are materially improved when there are other sources of light or means of reflection from surroundings. Diffused light from shop-windows and reflection from light-coloured surfaces of buildings and floodlighted surfaces, all help considerably to soften shadows, even up the illumination and by lessening contrast, to diminish glare. Even illuminated signs, if moderate in brightness and not too intermittent in action, may be helpful. It is said that on one occasion, in the course of a dispute with the police, the owners of the giant signs on Broadway (New York), threatened to throw the traffic into confusion by extinguishing all the signs, and thus withdrawing what had come to be a more potent source of illumination than the official public lighting!

Visibility by Silhouette.

The circumstances discussed above have led to two somewhat different schools of thought in regard to the lighting of roads where traffic considerations are paramount. In this country it has been concluded that, with the resources available, it is impracticable to light up objects on the roadway sufficiently brightly for them to be clearly seen at a distance (a motorist travelling at 45 m.p.h. should be able to see an object at least 134 ft. ahead). The only feasible scheme is to make the road-surface so bright that any object upon it is clearly revealed in silhouette. This method is aided to some extent by the polished nature of the modern road surface, which is otherwise rather a drawback from the lighting standpoint, but it necessarily involves concentration of light at angles slightly below the horizontal, and therefore some degree of glare. By careful design of the lighting equipment and attention to the positions of lights, however, excessive glare can be avoided and very fair uniformity of brightness can usually

Sodium – the Golden Way to safety



MAXIMUM VISIBILITY

NO GLARE

PHILIPS

"PHILORA" SODIUM ROAD LIGHTING

PHILIPS LAMPS LTD. "PHILORA" LAMP DEPT. 145, CHARING CROSS ROAD, W.C.2

BRITAIN'S BEST LIT HIGHWAY" (Daily Herald)

PURLEY WAY, CROYDON

The Mayor of Croydon opening the new Purley Way Lighting System. Left to right: The Mayor of Croydon, Alderman Arthur Peters, C.B.E., J.P. Sir Malcolm Campbell. Councillor A. Lester Boddington. P. J. Robinson, M.I.E.E. F. N. Rendell Baker, M.I.E.E. D. H. Ogley, Esq.

Road lighting history was made on Tuesday, Sept. 29th, when the Mayor of Croydon switched on the 235 "Philora" Sodium Lamps and made the Purley Way Britain's best lit road.

THE FOLLOWING FIRMS SUPPLY COMPLETE

PHILIPS "PHILORA" INSTALLATIONS

The Brighton Lighting & Electrical Engineering Co., Ltd.. St. Martin's Place, Lewes Road, Brighton, 7.

The Electric Street Lighting Apparatus Co., The Foundry, Canterbury.

Messrs. Engineering & Lighting Equipment Co., Ltd., Sphere Works, St. Albans, Herts.

Messrs. Holophane Ltd., Elverton Street, Vincent Square, London, S.W.1.

The Revo Electric Co., Ltd., Tipton, Staffs.

The Wardle Engineering Co., Ltd., Old Trafford, Manchester, 16.

PRESS REPORTS

DAILY EXPRESS:

"as seductive as any lighting in a West End night club .... cars, cyclists and pedestrians clearly visible. No shadows here—no glare. Head-lamps were unnecessary."

THE TIMES:

"It gives very clear vision and even illumination, free from black shadows. Even cyclists at 300 yards and over were easily visible."

THE STAR:

"I have seen few lovelier sights. The light diffusion is perfect . . . It shows the way to road safety by night."

THE AUTOCAR:

"The evenness of the amber illumination on the road appears most remarkable."

DAILY HERALD:

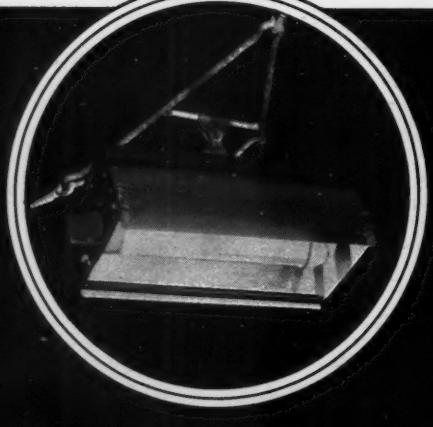
"Will make this arterial road the best lighted highway in the country."

DAILY MAIL:

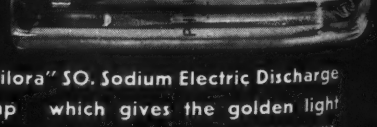
Sir Malcolm Campbell "full visibility, complete absence of glare . . . I have never been more impressed in my life . . . a general sense of safety that I have never before experienced . . . it is by far the best I have seen."

THE MOTOR:

"If you want to see what efficient street lighting can really be like, make a journey by night along the four miles of Purley Way . . . it is possible to see cars clearly at almost as great a distance as in the daylight."



235 Wardle "Liverpool" units, Cat. No. 4151 (designed by P. J. Robinson, M.I.E.E., City Electrical Engineer, Liverpool) and manufactured by The Wardle Engineering Co., Manchester, were used in this scheme. (Registered Design and Prov. Pat. 15316/36).



"Philora" SO. Sodium Electric Discharge Lamp which gives the golden light responsible for this amazing VISIBILITY.

SODIUM – THE GOLDEN WAY TO SAFET

obtained. The "pools of darkness" so often regarded as causes of accidents can be largely eliminated, at least so far as the most important areas of the road surface are concerned. On the other hand, the fact that road surfaces differ so much one from another, and change their reflecting character when streaming with water after rain, is admittedly a difficulty.

An alternative method, adopted apparently with success on certain Continental roads, aims at producing relatively intense illumination from screened sources of light, so that glare is reduced to a minimum. Complete success, however, seems to demand the spacing of lights at relatively short distances. The method is thus easier to apply to new arterial roads, such as those recently constructed abroad, than to old thoroughfares on which local authorities are usually loathe to sanction the expense of an entirely new installation, and usually require that the existing posts in their present positions should be used.

The Need for Public Lighting Engineers.

In conclusion, some reference may be made to the administrative difficulties of street lighting, which are quite as formidable as the technical ones.

Take, first, the case of important towns and cities. The cost of street lighting may be quite a substantial figure, involving a lighting rate of, say, 3d. to 6d. per head of population. In such cases it is surely well worth while to have a fully qualified and independent public lighting engineer to devote his whole time to this question. In some cities (such as Glasgow, Edinburgh, and Sheffield) this course has been followed with signal success. Yet it is still unusual. It is much more common for the man who attends to lighting to be associated with the gas or electricity departments, or to hold some other position which imposes many other responsibilities besides that of attending to the lighting.

Arterial Roads and Rural Highways.

The case of London, which is really a conglomeration of communities, with the Cities of London and Westminster at the core, is probably unique. There are over thirty different authorities concerned with the lighting of their respective areas, each taking independent action so that visitors from overseas are amazed at the contrasts in method and intensity met during quite a short journey. There is the further consideration that, as Greater London develops the character of many roads alters. Originally, purely residential roads may ultimately become busy arteries of traffic, so that the lighting no longer answers. Evidently some degree of supervision is necessary to deal promptly with such cases and ensure reasonable uniformity of standards.

The position has become acute, however, in the case of arterial roads and rural thoroughfares which pass through the areas of many different local authorities, some so small as to render the cost of providing adequate public lighting (not, be it observed, for their own people, but mainly for passing travellers from one town to another) a serious item. It is small wonder that the lighting of such connecting roads may undergo amazing changes within a few miles—especially when it is remembered that in England there was, until quite recently, no positive obligation for a local authority to provide *any* lighting within its area—though the position has now been somewhat modified by legislation.

Central Supervision Necessary.

This main problem, and many others allied to it, has been the subject of a study by a Committee operating under the Ministry of Transport, whose final report is still awaited.

In the meantime, however, the view has been widely expressed that we shall never get moderate uniformity in public lighting until some form of central supervision is created—until, in short, the "Lighting of the King's Highway" is no longer regarded as a parochial question but is given the status of a national obligation.

Coronation Display Lighting

The 1937 Ideal Home Exhibition

One of London's principal annual exhibitions, the "Ideal Home Exhibition," will be held in 1937 at the new Earl's Court during the period of Coronation celebrations, and for ten days longer than the usual length of time.

Especial attention will be given to decorative effects, in which all kinds of illumination will play a prominent part. Probably the most impressive will be the "Golden Hall of Homage," which will be constructed in the central arena, which has a fine roof span of some 250 ft. in width, unobstructed by any columns. In this Golden Hall the main note of the lighting will be a golden yellow, blazing down upon a huge statue of King Edward VIII., which is now being modelled by Sir William Reid Dick, K.C.V.O., R.A. It is a full-length portrait figure, attired in the robes of a Garter Knight-at-Arms.

On each side of the central arena will be designed gigantic friezes of modelled figures, standing about eighteen feet in height, depicting the peoples of the Dominions and the Colonies marching forward in a great cavalcade on their way to pay homage to the King-Emperor. Each of these great panels will carry appropriate scenic backgrounds behind the figures, devised in three main planes. Concealed lighting will be arranged to flood the friezes to give an effect on the modelled surfaces so that they appear to be cast in solid gold.

The local lighting will be aided by high flood-lighting in the great vault; and controlling dimmers will permit of any desired modification. W. G. R.

I.E.S. Photometric Section

Several attractive meetings have already been arranged by the Photometric Section. Members of the Illuminating Engineering Society are reminded that tickets for these "extra" meetings are not broadcast — though all members are welcome. Those who wish to get intimations of forthcoming events should, however, send in their names to the honorary secretary of the section (Mr. Kenneth F. Sawyer, Watson House, Townmead-road, Fulham, London, S.W.6), if they have not already done so.

This picture shows some effective decorative lighting by means of coloured Mazda Lamps at Coatham Enclosure, Redcar.
("Daily Mail" Photograph).

Progress in Electric Street Lighting

by W. J. JONES, M.Sc., M.I.E.E.

In his paper read at the Annual Conference of the Association of Public Lighting Engineers at Cheltenham on September 9th, 1936, Mr. W. J. Jones emphasised the importance of the time factor in seeing in the streets, the need for better lighting owing to the speed of modern traffic, and the remarkable progress made in electric street lighting, especially in regard to electric discharge lamps, during recent years.

"In olden times, along the street
A glaring lantern led the feet,
When on a midnight stroll;
But now we catch, when night is nigh,
A piece of lightning in the sky,
And stick it on a pole."

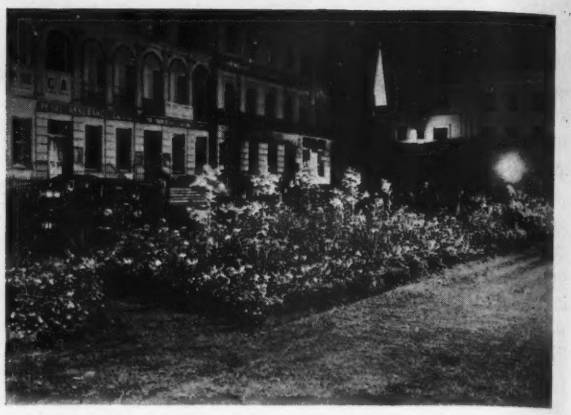
These words served as an introduction to an account of the new methods of lighting, introduced to cope with radical changes in conditions of the past twenty-five years. Instead of visibility at distances approximating to the width of streets, there is now a demand for distant seeing—a natural consequence of the upward trend in the speed of traffic. Visibility is largely a matter of contrast—but contrast values and brightnesses which suffice for leisurely seeing are insufficient when rapid and accurate perception is necessary.

The Time Factor in Seeing.

Street lighting good enough for slow-moving vehicles is quite inadequate for rapidly-moving traffic. A pedestrian walking at three miles per hour has twenty-three seconds to discern a stationary object 100 ft. ahead before he reaches it—but a motorist travelling at forty-five miles per hour has only 1½ seconds! Moreover, he requires, perhaps, a second to apply the brakes. During this time he travels 66 ft., and he will require another 68 ft. in which to pull up. He must, therefore, be able to see an object clearly *at least* 134 ft. ahead. (In this connection Mr. Jones showed the familiar experiment illustrating how a moving disc appears to go faster as the illumination is increased. The inference is that higher illuminations enable the eye to see quicker—and seeing a split second quicker will frequently avoid an accident.)

Tungsten Filament Electric Lamps.

Turning next to recent developments, Mr. Jones remarked on the general tendency to instal lamps at heights of 20 to 25 ft., a practice which enables routes to get full benefit from the greater efficiency of the larger lamps. He presented a diagram showing how the efficiency of filament lamps increases with wattage, being, for example, about 20 lumens per watt for a 1,500-w. lamp, as compared with the approximate 14 lumens per watt for a 200-w. lamp. Experience in a Midland town showed that, with rising wattages, the increase in light was far greater than the increase in cost. The ordinary 60-watt incandescent electric lamp gives 25 per cent. more light than it did only ten years ago. Incidentally, the advantage of the coiled coil lamp was pointed out. In one town of 100,000 population its use had enabled



The Promenade Gardens at Cheltenham, illuminated by specially designed Siemens floodlighting reflectors, each furnished with two-300 watt standard gasfilled lamps. The units were mounted on the trees, and arranged to give a definite cut-off on the far side of the gardens where they join the inner road,

15 per cent. more light to be given in all side streets—an advantage well worth £1,500 per annum, yet provided without any increase in cost.

Other diagrams illustrated the growth in consumption of electricity used for street lighting in Great Britain, which has risen from 49.5 million units in 1922 to 218.6 million units in 1934, and the fact that the increase in road traffic year by year has been almost exactly paralleled by the increase in electric light available per penny.

Group Replacement of Lamps.

The improved uniformity in production of filament lamps, to which members of the E.L.M.A. have devoted so much attention, is at least equally important. The existence of a uniform product makes "group replacement" a practicable and expedient practice. Occasional "outs" in a street-lighting system are unsightly, and replacing odd lamps at irregular intervals is a costly process. It is cheaper to replace lamps during period of cleaning (say, once a month). In one London borough it was recently decided to change all lamps after 1,100 burning hours. In 1931 6,000 lamps failed in service and were replaced at night, and 7,000 replaced before failure during daytime at cleaning period. By 1932 only 4,500 were replaced at night, and last year there were only 600 failures at night—with the result that a reduction in the maintenance staff of twenty-five and a saving of at least £300 per annum was found possible.

Electric Discharge Lamps.

Perhaps the most noteworthy advance, however, has been the introduction of electric discharge lamps. Although such lamps were only introduced in this country at the beginning of 1933, there are now no fewer than 15,000 electric discharge lamps lighting traffic routes in Great Britain, and 180 public lighting authorities have installed them in the areas under their control. There are more miles of streets thus lighted in Great Britain than in all the rest of the world.

Important improvements in the efficiency of electric discharge lamps have taken place during the last two years. Researches are continuing, and in the near future a mercury lamp operating at 60 lumens per watt may be expected. Efforts to bring about colour-correction are also being made.

Classification of Roadways.

Recently efforts have been made to effect a classification of roads for street lighting purposes. In this

connection the accompanying table, prepared by a committee of the British Electric Development Association, is presented.

Minimum (B.E.D.A.) Recommendations for Road Lighting.

Class of Road.	Lumens of Bare light source per sq. ft. of roadway.	Min. Mounting Height. Feet.	Min. Illumination on Road. Foot-candles.	Max. Spacing/ Height Ratio.
(1) Main Traffic Routes in Towns and Shopping Areas in Suburbs.	3	25	0.2	8
(2) Traffic Routes where vision of distant objects is of primary importance.	1.75—2	25	★	10—8
(3) Secondary Traffic Routes passing Roads of a Residential Character.	1.2	20	0.1	8
(4) Residential Roads.	0.3	15	0.01	12

*Here Road Brightness is of primary importance.

In the concluding portion of the paper, mention is made of a large number of towns and districts in which radical improvements in street lighting have been made since 1933. During the last three years 56,000 new electric posts have been installed on new building estates, and more than 90,000 for all purposes. Pictures of a number of typical installations of electric discharge lamps were also presented. It is interesting to observe that in the ten installations dealt with the average spacing varied from 120 to 225 ft., the mounting height from 21 to 25 ft., and the lumens at source per sq. ft. of roadway from 2 to 7.5. In two cases, both operating at 2.5 lumens per sq. ft., the capital costs were £868 and £1,232 per mile.

A table was also presented comparing the percentage of streets lighted by electricity in various Continental towns. In certain cities, such as Rome and Oslo, where there is little coal available, but abundant water-power, we find that the lighting is exclusively electric. In the London Metropolitan area the percentage was 58.5 in 1932, and had increased 17 per cent. during 1928-1932. For some other cities the percentages are 20 per cent. in Berlin, 62 per cent. in Copenhagen, 99.7 per cent. at The Hague, and 65 per cent. in Vienna.

Kerbline Visibility

In a contribution entitled "Some Further Aspects of the Street Lighting Problem," read at the Annual Conference of the Association of Public Lighting Engineers, at Cheltenham, on September 9th, 1936, Mr. F. C. Smith, Mr. K. F. Sawyer and Mr. D. Winslow drew attention to the desirabilty of arranging the lighting in streets so that the margins of the roadway are suitably and clearly defined.

The actual extent to which safe driving depends on a positive knowledge of the position of the kerbline may be a matter for discussion; but there is agreement that inability to distinguish the confines of the roadway clearly leads to dangerous uncertainty as to the driver's position. The traffic then tends to concentrate towards the middle of the roadway, and the effective width of the road is thus reduced. Headlights, while removing this disability, also tend to produce glare. In this connection, the authors presented some statistical data showing that the use of full headlights is rare on roads with an illumination level above that corresponding to 0.05 foot-candle test-point illumination. Other data relating to the prevalent use of dipped headlights suggest some inability on the part of drivers to distinguish the kerbline with confidence.

The driver of a car moving at normal speed requires to see the whole kerb up to some 200 feet ahead for comfortable safety. Good visibility is to be secured by making the ratio, Brightness of the horizontal face/Brightness of the vertical face, as large as possible. In some cases the lighter colour of the footpath helps to make the kerbline visible, but this aid cannot be relied upon, especially in wet weather.

The question of the precise value of the ratio of brightness necessary to give good visibility needs elucidation. The authors, however, prepared diagrams showing the variation of the factor with distance on typical roads, and also photographs illustrating their appearance. One important conclusion is that the ratios of the vertical and horizontal illuminations and of the corresponding brightnesses follow each other closely over quite long lengths of road, even when the kerbline is wet.

Another important consideration is that definition of the kerbline is assisted considerably when units are mounted on the kerb. The use of kerbline mounting may, in some cases, lead to the formation of a "dark lane" near the centre of the roadway; but the absence of such a dark lane between kerb and traffic lane (often associated with overhung and centrally suspended units) is a compensating advantage.

One other point emphasised is the prejudicial effect of wide spacing. When large units are spaced at considerable distances apart, it becomes almost impossible to avoid a high brightness of the vertical face opposite the lamp unless the width of road is considerable. At some intermediate point between this position and the point under the next lamp faces are apt to become equal in brightness, thus rendering the kerb indistinguishable.

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The Electric Discharge Lamp

A Survey of Development

by J. N. ALDINGTON

(Siemens Electric Lamps and Supplies, Ltd.).

Summary of a paper read at the Annual Conference of the Association of Public Lighting Engineers, held in Cheltenham, on September 10, 1936.

In his introductory remarks Mr. Aldington divided electric discharge lamps into three main classes: (1) lamps using rare gases or metallic vapours working at comparatively low pressures; (2) sodium lamps employing the electrically excited vapour of sodium; and (3) high-pressure mercury lamps, in which the mercury vapour develops a pressure greater than one-half atmosphere when the lamp is in operation.

It was also recalled that so-called high-pressure mercury lamps have been available for about three years, and the 250 and 400 watt types have been widely applied. The efficiency of such lamps is about three times that of the gas-filled (filament) lamp of similar wattage. The familiar hard glass lamps operating at one-half to one atmosphere are described as "standard high-pressure lamps." When the mercury pressure exceeds thirty atmospheres the lamps are artificially cooled. These are described as "super high-pressure lamps."

Mr. Aldington then proceeded to give particulars of the 150-watt lamp recently introduced, pointing out that an efficiency of thirty-two lumens per watt can be obtained, as compared with forty-five lumens per watt in the case of the 400-watt type. The discharge lamp does not operate automatically at its rated wattage. The current must be controlled by an impedance, and if the designed wattage is seriously exceeded there will be rapid falling off in the efficiency. In general, a loading of 3 watts per cubic centimetre gives a high value of efficiency maintenance throughout life. The average efficiency maintenance of standard pressure lamps up to 1,500 hours' life varies between 82 per cent. and 86 per cent. of the initial efficiency for the various wattages. The effect of overloading up to, say, 4.3 watts per cubic centimetre leads to somewhat higher initial efficiency, but a great fall throughout life.

Modification of Colour of Light.

Turning next to the colour-modulation of high-pressure discharge lamps, Mr. Aldington discussed first the effect of additions of cadmium and zinc. By this means both blue and red light are introduced into the spectrum. With an initial efficiency of thirty-seven lumens per watt 2.3 per cent. of red light can be introduced (estimated on a scale in which daylight has 15 per cent. of red).

As an alternative, combinations of electric incandescent (filament) lamps and discharge lamps may be contrived. The overall efficiency of such combinations usually lies between twenty and thirty lumens per watt, and the percentage of red light between 5 and 10 per cent. The most complete development of this idea is represented in the Siemens "Dual" lamp, which was briefly described by the author. In this device a 500-watt tungsten filament is connected in series with the discharge tube. After about ten minutes, when the discharge tube has reached its designed voltage, a portion of the filament is cut out. The lamp then operates in normal condition, has an efficiency of twenty-five lumens per watt, and gives approximately 7½ per cent. of red light, which is considered enough for most ordinary lighting purposes.

Super High-Pressure Lamps.

In order to operate lamps at higher pressures and obtain increased efficiency some material other than hard glass must be used for the containing vessel. Fused silica and quartz have the requisite qualities, but the production of an hermetic seal for the current leads proved a difficult problem. Various devices were described by Mr. Aldington, who mentioned that in 1936 a method of sealing thin wires of molybdenum, which had been locally flattened, directly into the quartz had been developed at the Siemens Works, Preston.

Provided quartz tubes are kept clean, they can be operated at temperatures below 1,000° C. without damage. Ultimately, it was found possible to increase the loading from 3 to 60 watts per c.c. for the quartz lamp and thus to increase the initial efficiency from some 32 to 40—50 lumens per watt, assuming the lamp wattage to be in the neighbourhood of 100 to 150 watts. There is thus an increase in efficiency of 30 per cent. Such a quartz tube can be mounted in a lamp bulb of ordinary 100 watt dimensions. The arc length of the quartz lamp is reduced to 25 mm., as compared with 70 mm. for the hard-glass lamp, and the tube width 10 mm., as compared with 20 mm. The light output of the quartz lamp is of the order of 4,000, as compared with 3,000 lumens, and the maintenance of efficiency should be substantially the same as for the hard-glass lamps. The area of the light column is only one-fifth of that in the hard-glass lamp, so that the relative brightness is in the ratio 7 : 1. The actual brightness is about 500—600 candles per sq. cm.

Conversion of U.V. Radiation into Visible Form.

A very interesting consideration is the possibility of converting some of the non-luminous energy of such sources into light. There does not seem much prospect of thus converting the large amount of infra red energy in the incandescent lamp, but the ultra-violet energy in the discharge lamp can be, in a measure, utilised. The effect of higher pressures is that the original lines in the mercury spectrum are increased in number, and at very high atmospheres, of the order of 200 atmospheres, the spectrum tends to assume a continuous character. This change is attributed to the high temperature in the central core of the discharge, stated to be of the order of 8,000° C. One result of the change is the introduction of an appreciable amount of red light.

Use of Fluorescent Powders.

A modification in colour of the light emitted may also be produced by using a fitting coated with some fluorescent material such as rhodamine, which fluoresces red. Unfortunately, in that case the rays producing the useful effect lie almost wholly within the visible spectrum, so that a diminution in efficiency takes place; furthermore, rhodamine is itself decomposed by ultra-violet radiation so that the efficient life of the coating is relatively short. Some mineral substances, however, exhibit useful fluorescence and have a relatively long life. Amongst these are the sulphides of barium, cadmium, and zinc. Provided that powders of such material will respond to the ultra-violet radiation in the mercury lamp, and can be applied in such a way as not to cut off any serious amount of the visible light, they can be usefully applied, not only for colour modulation, but with the object of improving the efficiency. If a mercury lamp is surrounded by a bulb on which is placed only a very small coating of such material, the effect is to increase the total amount of visible light emitted and at the same time to improve somewhat the percentage of red radiation. Available fluorescent materials can utilise some proportion of the very considerable percentage of energy radiated in the ultra-violet, particularly that lying between 2,900 and

4,000 angstrom units, which is the threshold of the visible region. But further research is needed to develop methods of harnessing the energy in the more remote regions of the ultra-violet.

One interesting development is the combination of the newer lamps with incandescent filaments to produce low wattage units of relatively simple construction, which do not require auxiliary gear. In one form the filament surrounds the discharge tube and assists the arc tube to reach its full brightness more rapidly.

Special Lamps for Lighthouses, etc.

There are interesting possibilities in the way of modifying the actual light source in the case of high-pressure mercury arcs. A cylindrical pencil-like discharge is suitable for floodlighting and for street lighting purposes. But for optical projection a disc or ball of light is preferable. By combining several discharges within the same vessel composite light-sources in a variety of forms and having special types of polar curves may be produced. When such types have passed the experimental stage they may prove useful for lighthouse work.

Water-Cooled Super High-Pressure Lamps.

In conclusion, some account of the phenomena which occur in artificially cooled discharge lamps was given. At very low pressures much of the energy is emitted at a frequency corresponding to a wave-length in the ultra-violet of 2,537 Angstrom units. At a high pressure the whole of this energy is reabsorbed by the mercury and re-emitted at higher wave-lengths. Under the right conditions mercury vapour can be excited not only by the collision of high-speed electrons, but also by certain frequencies of ultra-violet radiation. This phenomenon is termed photo-excitation. For very high pressures a narrow bore tube of, say, 2 mm. internal diameter may be necessary. With a current of one ampere and an arc voltage of 400 v./cm., the loading would then be 10,000 watts per c.c., as compared with the normal value of sixty. Some means of preventing overheating is, therefore, necessary, and water cooling has been applied. This step enables the attainment of very high internal pressures and very compact light sources. An example is a lamp only 25 mm. in length and 2 mm. in internal diameter operated with a power input of 1,000 watts. It has a brightness of the order of 40,000 candles per sq. cm. and requires only a few seconds to reach full intensity, when the voltage is of the order of 1,200 volts. This extremely high brightness and the efficiency of 60—70 lumens per watt should render it of value for lighthouses, aerodrome landing lights, searchlights, and cinema projectors—though the necessity for water cooling and the high voltage transformer are factors that, at present, necessarily limit its possible applications.

Headlight Problems: Dazzle and Fog

In a paper presented before Section G of the British Association, Dr. W. S. Stiles recently discussed several outstanding problems in connection with motor-car headlights, such as those associated with glare and fog. In regard to glare, no complete solution seems possible. Dr. Stiles has, however, worked out a means of evaluating degrees of freedom from glare, and on this basis determined figures of merit for an ordinary straightforward beam, a beam inclined downwards, and a flat-topped beam. The latter at one time seemed a hopeful device, but it is subject to several limitations. The cut-off is not very definite, and its effect may be spoiled by small faults in adjustment or variations in the level of the road or the loading of the car.

One seems to have heard of an ingenious idea for overcoming glare based on the use of red screens for the headlights and windscreens of cars going in one direction and corresponding blue-green screens for cars approaching from the other. Theoretically, the idea has merits, but the difficulty would be to arrive at a convention which would ensure cars approaching each other being thus diversely equipped.

A variant of the idea that seems more feasible is based on the uses of polarised light. Such a system would have been quite impracticable until recently, but the new "Polaroid" screens seem to make it a practicable proposition. The method involves considerable loss of light. Dr. Stiles remarks that the brightness of objects illuminated by the driver's own headlights would be reduced to less than a quarter, and, even so, the opposing headlights would not be quite invisible—but it certainly deserves to be explored.

Dr. Stiles again confirms the conclusion that there is no great advantage in using coloured light for driving in a fog—nor does he support the belief that yellow light is particularly efficaceous in diminishing glare.

Flashes

The lighting with sodium lamps of the 8-mile stretch of road between Haarlem and Amsterdam is now in regular operation, and is said to have fully answered expectations. We learn that the Belgian Government has now decided to light the Antwerp-Brussels road with electric discharge lamps. The lighting will also be with Philora sodium lamps, except in the built-up areas, where mercury lamps will be used. The lighting of Purley Way, Croydon, by similar methods formed the subject of a public demonstration about a month ago and excited much interest

* * *

The gas lighting system of Wallsend is to be modernised, and a ten years' contract with the Newcastle-on-Tyne and Gateshead Gas Company has been arranged. In Alloa there are also improvements in view; low gas lamp-standards are to be replaced by others of double the height, and reflectors and clock-control are being fitted to the new units.

* * *

Plans for the spectacular lighting of the New York World's Fair in 1939 are rapidly taking shape. Already the site is being illuminated by more than 100 mammoth projectors to facilitate night work. It is rumoured that a change from the usual "pageant lighting" is contemplated, a feature being the erection of translucent buildings composed largely of tinted glass blocks, illuminated from within.

* * *

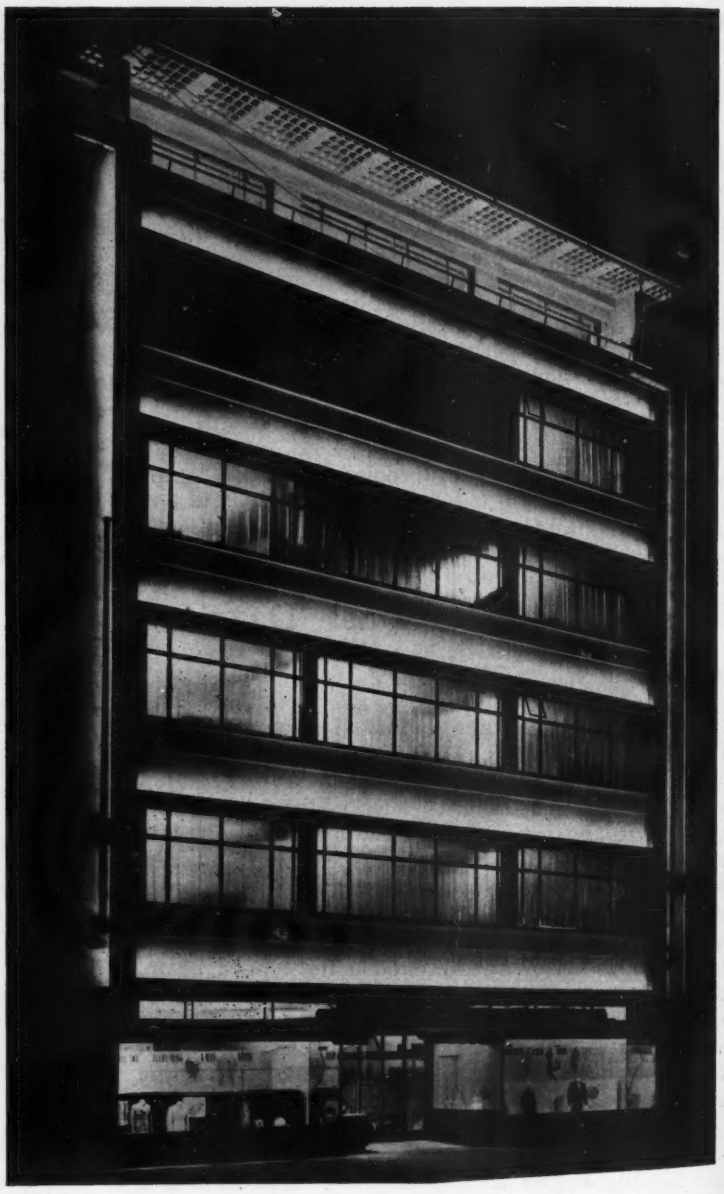
In Edinburgh, which has at present 251 miles of gas-lighted streets and 128 miles electrically lighted, the street lighting is to cost £15,000 this year—an increase of £4,500 occasioned by the rapid extension of the city's boundaries.

* * *

A forthcoming event of interest in Belgium is the "Quinzaine de la Lumière"—"Light-Fortnight" in Brussels during November 9-22. Besides conferences on school lighting, etc., there will be a lighting exhibition, somewhat resembling that held every autumn in the Salon de la Lumière in Paris.

Floodlighting with Neon Tubes

A striking display of concealed lighting by means of neon tubes in three colours outside a West End store. 1,200 feet of tubing (400 in each of the three colours) were employed.



A view of the exterior of the new Simpson Store in Piccadilly; the first example of neon floodlights for this purpose.

The illumination of the surfaces of buildings by concealed incandescent lamps—usually described as "floodlighting"—is now a familiar feature in the West End of London, where displays utilising neon tubes in various designs and colours have likewise multiplied exceedingly during recent years.

The illustration, however, shows something new—the first example in this country of the floodlighting of the surface of a building by means of neon tubes, the tubes being themselves concealed from view so that only the illuminated frontage of the building is visible.

The installation comprises three-colour lighting in blue, green, and "special red" tubes, which are fitted in five horizontal coves each approximately 57 ft. long, running above the windows of each storey. In addition, there are two vertical coves similarly equipped on either side, each about 52 ft. in length. In all, therefore, about 400 ft. of tubing in each colour are used. The combined effect of the three colours in full operation is to give a pale gold light. Dimmers are, however, mounted in each circuit, so that colours are separately controlled and the combined colour effect can be varied within wide limits.

A feature of the design of the architect responsible, Mr. Joseph Emberton, F.R.I.B.A., is the manner in which the faces of the building are inclined towards the lamps, so as to diminish the obliquity of the rays and enable the best effect of the light to be gained.

In addition to the floodlighting display a neon letter-sign of unusual type has also been provided at the Jermyn-street entrance, and the canopy lighting, likewise utilising red, green, and blue tubing, is also of interest.

The appearance of such an installation as that described is so striking as to serve in itself as a most effective advertisement.

We are indebted for the above illustration and data to Claude-General Neon Lights, Ltd., who undertook the work in co-operation with the architect. Now that the ice has been broken, and it has been demonstrated how effective concealed lighting with neon may be, the idea will, no doubt, be more widely exploited. It has obvious possibilities for decoration, especially in regard to the skilful application of pleasing contrasts in coloured light.

Artificial Light Stimulates Plant Growth

A striking demonstration, arranged in one of the windows of the Office Central Electrique in Paris, is described by P. Chaumier in B.I.P. Two cherry trees, planted amidst grass, were illuminated by 300-watt lamps, furnishing approximately 30 ft.-c. on the grass and 100 ft.-c. on the foliage. The lighting period was thus prolonged from seventeen to twenty-two hours, and the temperature and humidity were controlled. Leaves were formed by February 18, blooming took place during March 1-13, artificial fertilisation (no wind or insects being present in the enclosure) was effected during March 7-8 and the first fruits were obtained on April 2, three months in advance of results by natural culture, and ten days ahead of those when ordinary forcing measures are adopted.

Special Problems in Industrial Lighting*

by R. O. ACKERLEY
(Illuminating Engineering Department of the General Electric Co. Ltd.)

(Continued from p. 305, October, 1936.)

We now come to the consideration of problems grouped under our second type of special condition, namely, those where the nature of the surrounding atmosphere calls for the use of special fittings or the special arrangement of standard fittings. Such surroundings can be divided broadly into three types, those where the atmosphere is moisture laden, those where it is laden with acid fumes and similar noxious vapours which are liable to attack the materials of which lighting fittings are made, and those where explosive or highly inflammable vapours are present.

Fittings for Use in Moist and Acid Atmosphere.

The requirements for moisture and acid laden atmosphere are broadly capable of solution by the same method, namely, the use of fittings proof against atmospheric attack, the most common type comprising a porcelain top, a well glass with rubber or other washer and a vitreous enamel over-reflector of the dispersive or angle type. Such fittings are completely satisfactory in moisture laden atmosphere, but where acids are present even with this combination the rubber washer and the enamel reflector are both liable to attack. The cost of rubber washers is, however, very small, and so long as a washer remains undisturbed it will continue to serve its purpose. This means in effect that replacement at a cost of a few pence is required only as often as the well glass is removed, an event which, as it is a closed fitting into which dust cannot enter, probably only takes place when the lamp requires replacement.

The problem of the reflector is a more serious one, as while some vitreous enamel surfaces are in themselves proof against acid attack, it is usually commercially impossible to carry all coatings of the vitreous enamel film unbroken round the edges of the metal base, so that the top and bottom edges of the reflector and anywhere where fixing holes are drilled are danger points at which corrosion may start and gradually eat away the reflector. Provided, however, that the main surface of the reflector has a good ground coating and is well covered with the vitreous enamel without pinholes or faults in enamelling, the reflector will stand up for a very considerable period of time.

There are also available fittings in which the porcelain top is combined with a silvered glass reflector blown as an enclosed globe, the silvering being protected by a copper backing and a lead or other acid resistant coating. Such fittings, which are made to give either a concentrated or widespread light distribution, combine great efficiency with equally great acid resisting properties. While porcelain is probably the best acid resistant material for the body of a fitting, some people object to its use owing to the fact that compared with metal, it is easily breakable. In circumstances where risk of breakage from external causes is great, various metals may be employed for the fitting, such as heavy galvanised iron, gunmetal, monel metal, aluminium, etc., each of which may have special advantages according to the nature of the fumes in which the work has to be carried out.

Fittings for Use in Inflammable or Explosive Vapour.

The problem of fittings for use in inflammable or explosive vapour is a more difficult one. The Home Office regulations require that any fittings which are to burn actually in the vapour-filled area shall be of flame-proof construction and shall carry a certificate to this effect issued by the Mines Department Testing Station at Buxton. The snag about this regulation is that any lighting fitting of flame-proof construction is almost inevitably very bulky and costly and inefficient from the illumination point of view in relation to its wattage. Furthermore, only relatively little control of light by reflectors, etc., is possible. For this reason it is recommended that, where ever possible, this lighting problem be solved by putting suitable standard lighting equipment outside the actual danger area. In the case of factories with north lights this can be done by lighting through the glazed roof, either with angle reflectors or floodlight fittings, a method which combines absolute

Fig. 1. Porcelain Fittings with diffusing well glasses in the damp and acid-filled atmosphere of a bacon factory.

safety with high efficiency. Where the factory is built on more than one floor so that north lights are not available, lighting fittings may be flushed into the ceiling behind a gas-tight glazing and serviced from the floor above, and in other cases lighting through the windows has been carried out very effectively.

Cellulose spraying is one of the processes in most general use where inflammable vapour is present; and where spraying is carried out in individual booths exhausted by a forced draught system, the room in which the booths are situated is not considered as part of the danger area, provided it is not used for drying off the sprayed articles. In such cases very effective lighting can be installed in the form of concentrating reflectors directing a beam of

*We are indebted to the courtesy of the General Electric Co., Ltd., for the use of the illustrations accompanying this article.

Fig 2. Daylight blue lamps facilitating the sorting of shale from coal.

light over the operator's shoulder. This system has the advantage that extremely efficient reflectors can be used, and the light is concentrated on to just that part of the product on which the operator is working. The use of cellulose spray introduces an additional difficulty, in that not only must any fittings in the danger area be flameproof, but they must also have a very limited temperature rise owing to the fact that the products of spraying are liable to settle on the fittings and will spontaneously ignite at a relatively low temperature. This places a very definite commercial limitation on the wattage of fittings that can be employed, as the higher the wattage, the bigger must be the body of the fitting to give the necessary heat dissipating surface, and a practical commercial limit is soon reached. In the case of most other inflammable processes, this restriction does not apply within the limits of temperatures likely to be attained by lighting fittings, so that the production of higher wattage fittings for use in such situations as oil plants is not impracticable.

This whole problem of lighting under inflammable conditions is receiving very close attention from the Inspector of Factories Department of the Home Office, and while, in this article, the author has attempted to give a picture of the practical effect of the regulations as they stand to-day, it is strongly recommended that the above department should be consulted in all matters pertaining to the placing of lighting fittings in a danger area. In the meantime, the alternative method of putting all fittings, wherever possible, outside this area has obvious advantages.

Fig. 4. High pressure mercury discharge lamps provide the necessary colour and quality of light for coal picking.

Fig. 3. Daylight blue lamps in the machine room of a laundry enabling scorching to be easily detected.

Special Colour-Quality of Light.

Lastly, we turn to those situations where a special colour-quality of light is required. The colour-quality of light most generally called for is usually referred to as "daylight," but actually this is a very loose title, which describes accurately neither the equipment used nor that, in fact, required for a very large number of those processes for which it is specified. There are, of course, many processes where a light with a colour-quality as close as possible to true daylight is desirable, and we will consider those later, but for the moment let us examine the others. The light source in most general use for industrial lighting, the tungsten lamp, has, in comparison with daylight, a considerable deficiency of blue rays in proportion to red. This not only means that, taking daylight appearance as the standard, the apparent colour of articles is distorted under ordinary tungsten light, but it also means that, assuming there are any processes for which an adequate percentage of blue light is advantageous, such processes cannot be carried out so well under artificial light as by day. In practice it is found that there are in industry many such processes, and one may mention well-known examples, such as the sorting of coal from shale and other varieties of ore-sorting processes, certain inspection processes in the steel and iron industry, in the cement industry; and there are countless others.

Fig. 5. The dope shop of an aeroplane factory illuminated by angle reflectors placed outside the shop and lighting through the windows.

For such purposes it has been common in the past to find installed so-called "daylight-blue" lamps, or fittings fitted with "daylight-blue" glasses. None of the manufacturers of "daylight-blue" lamps, and few of the manufacturers of glass or other filters would claim that the light given by their equipment was of true daylight colour composition, but it often admirably served its purpose, which was, had we realised it, simply to give a light with a reasonably high proportion of green and blue rays. That this is so has been clearly demonstrated by the effectiveness of the high-pressure mercury electric discharge lamp for many of these processes. Such lamps are further from daylight than tungsten, in that while relatively rich in yellow, green, and blue rays, they are practically entirely deficient in red light. Nevertheless, they have proved even better than daylight-blue lamps for many of the processes described above, a clear indication that it was green or blue light and not true daylight that was required. The advantage from the efficiency point of view of using such electric discharge lamps, wherever the process permits it, is obvious, for whereas, in the past, to obtain a given amount of blue-green light we had to use extra current to compensate for the absorption of the filter used to reduce the preponderance of red rays, to-day we can get that blue-green light for a consumption of current far less than that of the uncorrected tungsten lamp.

Fig. 7. A typical 500 watt industrial unit employing Lamplough Daylight filters for colour matching work.

"Daylight Units."

There are, however, some purposes for which "daylight-blue" lamps and the filters which have some degree of colour correction without making any claim for true daylight value, will serve a useful purpose, and these are mostly for those processes involving more accurate colour discrimination in the blue end of the spectrum than is possible with unadulterated tungsten, but not requiring the extreme colour accuracy necessary for true colour matching. Such light sources as exist to-day to give true, or nearly true, daylight colour values are relatively costly and of extremely low efficiency, giving light outputs in the region of 2 lumens per watt as compared with the 10 to 15 lumens per watt of uncorrected tungsten lamps and the 5 or 6 lumens per watt of the average reasonably good filter giving partially corrected light. Obviously, if the latter give a sufficient degree of correction for the process in hand it would be uneconomic to insist on true correction, and this applies in cases where no more is required than a good general idea of how a certain colour will appear in daylight. Where, however, accurate grading or matching of colours is involved, such fittings are relatively useless, and it is very false economy to employ them where a fault may easily involve the wastage of a batch of manufactured products or the upsetting of a valued customer.

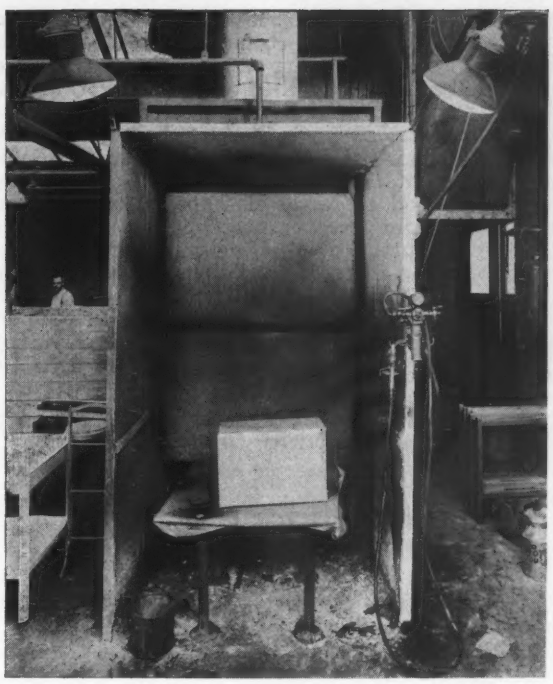


Fig. 6. Dust-tight fittings installed outside a spray booth shining over the operative's shoulder give perfect illumination without the necessity of the fittings being put in the explosive atmosphere.

Owing to the unsatisfactory performance of many of these so-called "daylight-units," some manufacturers will only carry out their more accurate matching processes under natural daylight, a restriction which may at the best complicate factory organisation, at the worst, materially affect output. The writer believes that there are at least two methods of obtaining colour values sufficiently close to natural north sky daylight for 99 per cent. of processes. One of these methods is by the use of double glass filters of the patent "Lamplough" glass, the other by the use of the carbon dioxide discharge. Both these

Fig. 8. Bench type carbon dioxide colour matching unit installed in a hosiery factory.

systems are, as indicated above, relatively costly and of low efficiency, but in so far as in most industries the processes of matching or grading are carried on by a small number of skilled operatives working in a special part of the factory, the correct lighting of their area of operation is likely to be a good investment. There is little to choose between the Lamplough glass filter method at its best and the carbon dioxide method, so far as closeness of the spectrum to true daylight is concerned; but while the latter has the advantage of absolute constancy under all conditions, the filter method depends on the glass filters being correctly graded for the colour temperature of the lamp filament, and as this colour temperature varies appreciably with rise and fall of voltage, ageing of the lamp, etc., even within the permitted voltage variations and normal life of the lamp, absolute constancy of colour can only be attained by the installation of a voltage regulator and the careful selection and frequent changing of lamps. The carbon dioxide discharge, however, so far as the colour of the emitted light is concerned, is quite unaffected by normal voltage variations or the ageing of the tubes, and for this reason a constancy is assured which allows of the perfecting of an absolute standard of colour values, a constancy which is far greater than that of natural daylight, which varies from month to month, from morning to afternoon. For this reason some industrialists, employing the carbon dioxide method, prefer to do all their matching under the artificial light, and actually exclude daylight even where it is naturally available.

"Light Aids for Night Sports."

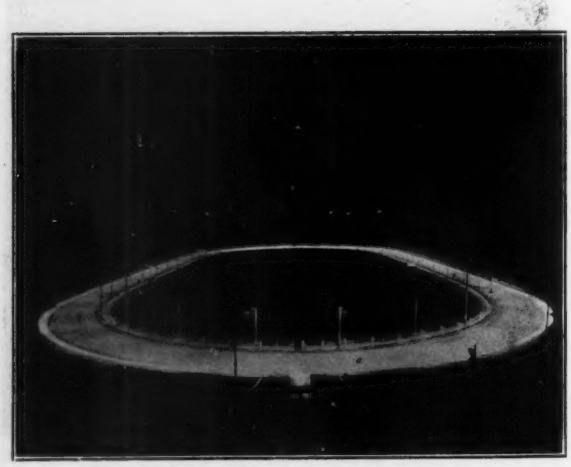
The above is the title of an illustrated article in "The Reflector," which is issued by Benjamin Electric, Ltd. The use of artificial light to enable sporting events to be followed by night is a comparatively new development and a rapidly extending one. We illustrate two tracks, one at the Clapton Stadium and the other at the famous stadium at Wembley.

At the Clapton Stadium the lighting is effected by forty 1,500 watt concentrating type Benjamin reflector fittings spaced 26 ft. apart and 20 ft. above the track, and on the terraces 61 Duoflux 500 watt floodlights are used 60 ft. apart, giving an average illumination of 4 foot-candles.

The track lighting at Wembley is furnished by Saaflux elliptical reflectors equipped with 1,000 watt lamps. Two parallel rows of fittings spaced 30 ft. apart and mounted 20 ft. high are used, and an illumination of 15 to 20 foot-candles is secured.

There is little doubt that night lighting will be extended to other forms of sport. At the famous Arsenal football ground floodlighting units have been installed to enable work to be commenced on the ground on winter evenings immediately the match is over. Although floodlighting for regular football matches is not at present very sympathetically regarded by the powers that be, it is probably only a question of time before it is exploited to some extent, at least as a supplement to daylight on exceptionally dark winter afternoons.

The playing of "lawn" tennis on wood courts under cover by artificial light has been usual for years, and we understand that the number of artificially-lighted bowling greens and practice cricket pitches under cover is steadily increasing.

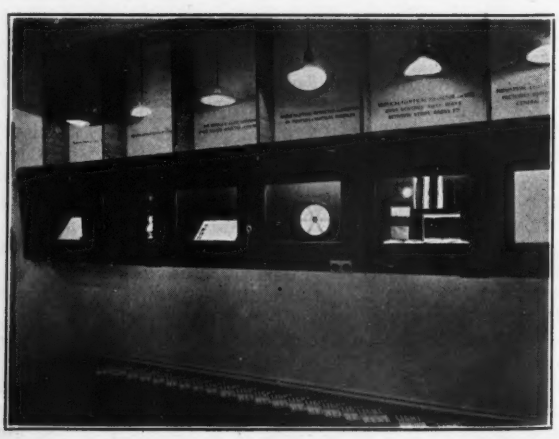


The Wembley Greyhound Racing Track.

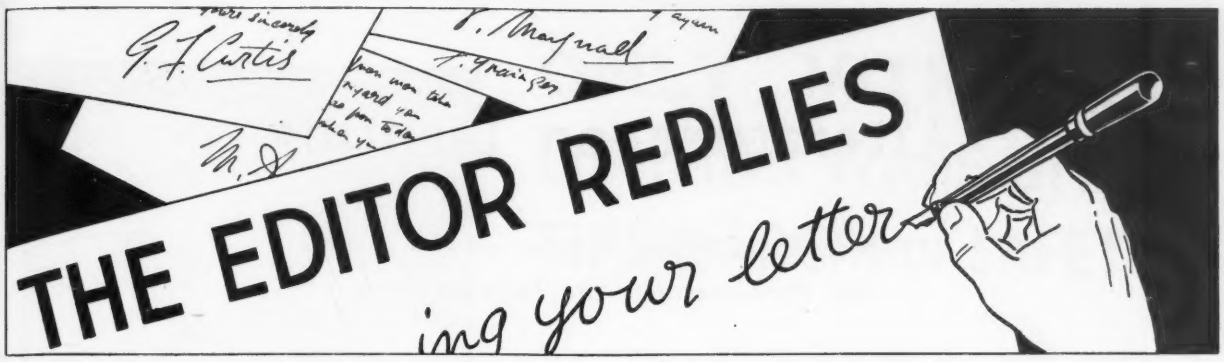
A general view of the Clapton Stadium showing the excellent track and terrace illumination.

The Mortimer Gall Lighting Centre.

An event of interest on October 8 was the opening by Lord Delamere of the Mortimer Gall Electrical Centre at 115-7, Cannon-street, London, of which Mr. J. Mortimer Hawkins, a member of the I.E.S., is the founder. The display in the window and the contents of the room behind it are arranged on enterprising lines. The main idea of the Centre is to approach contracting jobs from the lighting end—to determine exactly what conditions of illumination are desirable and to select and place fittings, outlets, and wiring accordingly. Visitors will find a number of novel and interesting devices. We will only mention one—a method of lighting pictures by beams of light from slots in the opposite wall, that seemed to be very effective.



Some of the Exhibits illustrating fundamental principles of lighting.



"He is an Editor, Sir — a Man of Letters—to some of which he accords an answer."

These series of articles on "Light in Daily Life" has already brought us a number of letters. Searchers for historical data on lighting may be referred to the introductory chapter of "Modern Illuminants and Illuminating Engineering" (Gaster and Dow), which contains a useful list of works in an appendix. To these and other inquirers we may also recommend the Patent Office Library (Southampton-buildings, Chancery-lane, London), which is open to the public in the evening as well as by day. and contains quite a useful selection of books and periodicals dealing with light and illumination.

Our attention has also been drawn to a sentence in the October issue (p. 301) to the effect that lens defects should be corrected by the oculist before the lighting engineer can do his part. We are assured that the writer did not intend any professional discrimination, nor to disparage the excellent work of qualified opticians. He only meant to emphasise the fundamental truth that defective eyes must receive attention before they can make full use of the illumination provided.

Amongst other contributions there is a lengthy one from Mr. G. V. Downer, on which we wish to comment somewhat fully, as it raises points of great importance. Mr. Downer questions the suggestion that the increase in the **number of people wearing glasses** can be regarded as mainly due to greater facilities for their provision. Also—and this is certainly a point—he recalls the fine tapestry and embroidery, watchmaking, etchings, fine carving, and other fine arts and crafts of the past followed in days when spectacles were little known and used. He also compares present conditions with those in the earlier days of the industrial revolution, when much fine work was certainly done, even before electric light was introduced.

He contends that much of the increasing eye-strain of recent years is due to (a) the more unnatural quality of uncorrected light, and (b) the increasing use of unnecessarily high intensities. The human eye, he suggests, is not naturally adapted to the greater preponderance of red, yellow, and orange rays, and a relative deficiency in violet and blue as compared with daylight. It is important to avoid both glare and unnecessary intensity, and it is desirable to obtain a closer approximation to daylight by means of filters, whenever possible. But there is, he suggests, no useful object in comparing the high intensities of June sunlight with the artificial illumination usual in living rooms. We do not require anything like full daylight in order to see comfortably; moreover, daylight undergoes enormous variations everyday between sunrise and sunset.

The chief differences between natural and artificial light he places in the following order of importance: (1) diffusion; (2) colour; (3) and (4) intensity and constancy. The two latter, indeed, he regards as of little importance, in view of the enormous variations in daylight and the powers of adaptation of the eye.

This, we think, is a fair statement of Mr. Downer's case, which is argued with ability. It is one on which the opinions of experts on the human eye is desirable; but for the moment there are certain points on the other side that might be made, namely, (1) the fine arts of the past were probably practised mainly by daylight, and their execution was doubtless slower than is usual to-day. They were only practised by the minority (whose eyesight may have suffered, for we have no precise statistics); (2) even in the early days of the industrial revolution the proportion of work done by daylight was surely much greater than is the case nowadays; but such artificial light as was available (e.g., from candles or flat flame gasburners) was even redder than the colour of artificial light to-day, and it can hardly be contended that the very low illumination then used was a positive advantage.

(3) The writer himself rather likes corrected artificial light for near work, but not for distant vision; but others think differently. There seems no consensus of opinion and no definite scientific proof that corrected artificial light is better for the eyes than ordinary artificial light; (4) No one imagines that full outside daylight illumination is necessary for reading, but many of us do prefer illumination very much higher than the three foot-candles which Mr. Downer thinks sufficient; (5) the effect of higher illuminations on processes involving inspection of small objects and considerable ocular effort is susceptible of proof and is illustrated by such experiments as those of the D.S.I.R.

To sum up, we do not think that the eye is likely to be harmed by artificial illuminations of the same order as those often prevalent in rooms lighted by daylight; we see no reason to recommend "corrected" artificial lighting to people who do not care for it—though for certain eyes and for close vision it may be preferred—but we are with Mr. Downer all the time when he stresses the importance of good diffusion and absence of glare.

Our attention has been drawn to the suggestion that the Ministry of Transport, in surveying the main roads of the country, should make use of night inspections by aeroplane, in order to determine the uniformity of the lighting. One rather questions whether this method would appeal to the school who adopts road-surface brightness as the chief criterion. A spread of brightness, due to glancing illumination from distant lights, that appeared high and uniform to the driver of an approaching car, might appear very different when viewed from above!

Literature on Lighting

(Abstracts of Recent Articles on Illumination and Photometry in the Technical Press)

(Continued from October, Page 323).

I.—PHYSICS AND RADIATION.

228. Graphical Construction for a Refracted Ray.

A. Bloch. J. Sci. Inst., 302, Sept. 1, 1936.

A graphical means for determining the direction of a refracted ray, without involving any calculation, is described. S. E.

229. The Calculation of Filters for Colour Temperature Conversion.

K. S. Weaver. J. Opt. Soc. Amer., 26, pp. 339-342, Sept., 1936.

The theoretical transmission of an ideal black body conversion filter is given, together with a chart for solving several problems involved in the design and examination of conversion filters. F. J. C. B.

II.—PHOTOMETRY.

230. Photometering Raw Silk.

Robert Finlay. Electronics, Vol. 9, No. 7, p. 12, July, 1936.

The problem of developing photo-electric equipment to measure evenness of silk thread, and give a statistical evaluation of its variation, has been solved by the development of the apparatus described in the article. Full details of this development and the problems presented are given, with a description of the circuit of its operation. S. S. B.

III.—SOURCES OF LIGHT.

231. Science and Lighting.

C. C. Paterson. Elect., 117, p. 362, Sept. 25, 1936.

A summary is given of a recent lecture to the British Association on recent progress in various mercury discharge lamps. C. A. M.

232. A Therapeutic Arc Lamp.

R. G. Weigel and O. H. Knoll. Das. Licht., 57, March, 1936.

A new arc lamp designed for medical purposes is described. It uses carbons impregnated with an iron salt and produces a magnetic controlled arc about 7-8 cms. long at a pressure of 100 v., and consuming about 18 amps. It is said to be more efficient in a therapeutic sense than the arc lamps used formerly. S. E.

IV.—LIGHTING EQUIPMENT.

233. Some Lighting Designs.

Anon. Elect., 117, pp. 376-8, Sept. 25, 1936.

Numerous photographs are given of representative examples of the trend in the design of lighting fittings for the present lighting season. C. A. M.

234. Lighting Systems and Methods.

Anon. Light, V., No. 7, pp. 39-45, Sept., 1936.

The characteristics of direct and indirect lighting are discussed. A brief summary, with examples, is given of present day methods, including suspended fittings, portable equipment, built in lighting equipment, both direct and indirect, and multi-directional shadowless equipment. C. A. M.

235. Polarised Light for Safe Night Driving.

L. W. Chubb. El. Journal, Vol. 33, No. 9, p. 418, Sept., 1936.

Explains the principle of the elimination of glare from headlights by the employment of polarising screens on headlights and windscreens. R. G. H.

236. The A.P.L.E. Exhibition.

Anon. El. Rev., Vol. CXIX., No. 3069, p. 375, Sept. 18, 1936.

Describes, with illustrations, the exhibition of public lighting equipment at the A.P.L.E. Conference at Cheltenham. R. G. H.

V.—APPLICATIONS OF LIGHT.

237. Lighting of Malvern Boys' College.

Anon. El. Times, 90, p. 417, Sept. 24.

A photograph shows the lighting of the east end of the chapel, in which striking lighting effects are said to have been obtained by a combination of floodlighting and architectural lighting tubes. W. R. S.

238. Modernise Lighting for Drafting Room.

Anon. El. World, 106, p. 2878.

Details are given of a lighting scheme used in a large drafting room, in which the units combine filament and mercury-vapour lamps. Each unit consumes 850 watts, and a uniform illumination of 20 foot-candles is provided. S. S. B.

239. Electric Discharge Lighting.

Anon. El. Times, 90, pp 331-335, Sept. 10, 1936.

A description, with photographs, of the street lighting at the A.P.L.E. Conference. Some photographs of floodlighting are also shown. W. R. S.

240. New Transmission System Avoids Coupling Equipment for Broadcast Tower Lighting.

Anon. Electronics, Vol. 9, No. 7, p. 38, July, 1936.

Details are given of a system for supplying power to lights on insulated radio towers. It makes use of a con-

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centric transmission line connecting the tower with the light power supply, which eliminates the necessity of any other protective apparatus. S. S. B.

241. Anniston Has Newest Viaduct Lighting Job.

Anon. El. World, 106, p. 3029, Sept. 26, 1936.

Some details and a photograph are given of the lighting of a viaduct at Anniston, U.S.A. The main interest lies in the type of unit used, which is a recessed unit, with curved prismatic front glass; and the units are placed only a few feet above the road surface. S. S. B.

242. Train Lighting.

H. H. Helmbright and F. B. Lee. Light, V., No. 7, pp. 21-25, Sept., 1936.

A description is given, with numerous photographs, of the lighting equipment of a modern short-distance American steam train. C. A. M.

243. Autumn Illumination.

Anon. El. Times, 90, p. 337, Sept. 10, 1936.

New illumination devices at Southend are pictured and described, and details are also given of illuminations at South Shields and Chester. W. R. S.

244. Electricity at the Zoo.

Anon. El. Rev., Vol. CXIX., No. 3,071, p. 436, Oct. 2, 1936.

Describes, with photographs, the electrical lighting and heating installations at the London Zoological Gardens. R. G. H.

245. Electric Lighting on the S.S. Awatea.

Anon. El. Times, 90, p. 301, Sept. 3, 1936.

Describes in some detail the lighting on a modern "luxury" liner. Photographs given show that the lighting appears to be modern without being extremely so. An interesting feature is provided by two neon signs showing the name of the ship. The letters of this sign are 42 in. high. W. R. S.

246. Fluorescent and Phosphorescent Materials in Lighting Technique.

Riehl and Wolf. Das. Licht., 41, March, 1936.

After a brief sketch of the modern theory of phosphorescence and fluorescence, some applications of phosphorescent and fluorescent materials in lighting practice are given. Among these applications, the use of fluorescence in the detection of radio activity and in the improvement of the spectral composition of the light given by mercury vapour lamps is given in some detail. S. E.

247. Fluorescent Lighting.

Anon. El. Times, 90, p. 395, Sept. 24, 1936.

A short description of the ultra violet lighting effects used in a show produced at the Victoria Palace, London. W. R. S.

248. Rays from New Lamp Retard Mould Growth.

Anon. El. World, 106, p. 2736, Aug. 29, 1936.

Some information is given of a low wattage gaseous conductor lamp which is used for radiation of perishable goods, such as meat or pastries, to retard the growth of mould. It also enables meat to be aged much more rapidly. S. S. B.

Recent Patents

(Abstracts of recent Patents on Illumination & Photometry.)

No. 449,952. "Improvements in or Relating to Light Fittings."

The General Electric Company, Limited, and Ryde, J. W. Dated January 7, 1935.

According to this specification a fitting for utilising an incandescent lamp in combination with one or more high pressure discharge lamps comprises a socket for receiving a discharge lamp, a series of sockets each adapted to receive an electric incandescent lamp and means for receiving a switch adapted to short circuit one or more of the incandescent lamps at a predetermined stage in the variation of the voltage/current characteristic of the discharge lamp which occurs at ignition. With this fitting the incandescent lamps are all connected in series with the discharge lamp prior to and at ignition and some of them are short-circuited when the voltage drop over the discharge lamp increases as its pressure rises.

No. 450,078. "Improvements in and Relating to Electric Lamps."

The British Thomson-Houston Company, Limited, Dated January 18, 1935. (Convention, U.S.A.)

This specification covers a lamp comprising a tubular glass bulb having a metal disc sealed to each end and forming an end wall and a laterally extending mounting and terminal prong secured to, or integral with, each of the discs.

No. 451,038. "Improvements in or Relating to Railway Signal or Like Oil-Burning Lamps."

Baker, E. W., and Lamp Manufacturing and Railway Supplies, Limited. Dated February 2, 1935.

This specification describes a railway signalling or similar lamp in which the burner mounting is constituted by a part fixed relative to the lamp casing so that the burner and thus the flame are accurately fixed in relation to the lens. The lamp reflector is preferably also fixed to the casing.

No. 451,145. "Improvements in or Relating to Beacons for Aircraft and the Like."

The General Electric Company, Limited, and Waldram, J. M. Dated June 7, 1935.

According to this specification sharply defined occultation of a revolving beam is produced by means of an image of a shadow bar or the equivalent rotating in the opposite direction to, and at the same angular velocity as, the beam. Thus when the edge of the image of the shadow bar meets the beam the intersection of the beam with this edge will be at rest relative to the ground.

No. 451,332. "Improvements in and Relating to Illuminating Appliances."

Holophane, Limited. March 19, 1935. (Convention, France).

This specification covers a street lighting fitting for producing an asymmetric light distribution having a reflector enclosing the light source to reflect light in the desired directions and vertical reflecting prisms arranged beneath the reflector in zones between the desired directions. The prisms serve to re-direct some of the light into directions intermediate those in which the light is reflected directly by the reflecting surfaces. Horizontal reflecting prisms may be arranged between the vertical prisms and the reflecting surfaces.

No. 451,709. "Improvements in or Relating to Light Transmitting Means for Lamps and Lights."

McNaught, A. J. March 29, 1935.

According to this specification a lantern for transmitting light rays in radial directions from a central source comprises two complete or partial concentric rings of transparent louvres, each louvre being in the plane of a chord of the circle in which it is mounted, the louvres in each ring being inclined in opposite directions, and arranged so that the inside edge of each louvre of the outside ring is approximately at the same radius as the outside edge of a louvre of the inside ring. The rings of louvres may be of differently coloured glass, and the whole may be enclosed by lenses.

No. 451,830. "Improvements in and Relating to Means for Illumination Controlled by Photoelectric Devices."

The General Electric Company, Limited. January 8, 1935. (Convention, Germany).

This specification covers a gas-filled electric discharge lamp, having within it a control electrode consisting of, or coated with, photoelectrically emissive material. The electrode lies outside the path of the main discharge through the lamp, and a magnetic field may be employed for concentrating the main discharge along the lamp axis. The lamp is preferably operated by alternating current and a voltage, approximately 180° out of phase with the anode voltage, is supplied to the control electrode through a condenser.

The lamp is ignited by a beam of light falling upon the control electrode which is out of, and substantially uninfluenced by, the discharge of the lamp itself.

No. 452,009. "Improvements in or Relating to Electric Light Illuminations."

Allom, G. February 13, 1935.

This specification covers a decorative light fitting comprising a reflector or reflectors which partially enclose a lamp arranged for general illumination by indirect or reflected lighting of one or more clear or transparent elements, each having portions of one of its surfaces diffusely translucent, the element or elements being arranged in a vertical, horizontal or inclined plane so that they are shielded from the direct light of the lamp and from the reflector, but some of the light from the lamp is caused to impinge upon an internal surface of a bevelled edge of the element or elements.

No. 452,011. "Improvements in and Relating to Shop Lighting Units, Floodlighting Units, or the Like."

Holophane, Limited, and English, S. February 13, 1935.

This specification covers a floodlighting or similar unit comprising a symmetrical parabolic reflector and a cover plate perpendicular to the reflector axis and having a series of refracting prisms, each having an arcuate surface, so that the light from the reflector parallel with the axis is refracted by the prisms by amounts varying from zero to some maximum. The prisms are arranged to produce a light distribution on one side only of a plane through the reflector.

Progress in Illumination

Some Notes on the Exhibits at the Opening Meeting of the Illuminating Engineering Society, on October 13, 1936.

The exhibits on this occasion were more numerous than ever, and in addition we have still to receive data and illustrations of some. We are, therefore, in this number, dealing mainly with those that came first on the list, and which were selected for their interest and representative character. Others will be described in our next number.

As usual the opening meeting of the Illuminating Engineering Society proved a popular event—in fact, the problem of accommodating the audience may require some revision in the arrangements next year.

We give elsewhere a summary of Mr. Cunnington's presidential address (p. 335). Appropriate acknowledgment was made of the services of the retiring president, Mr. A. W. Beuttell, and also of those of Mr. Percy Good, who, after completing the prescribed period of three years, retires from the position of honorary treasurer.

The Gaster Memorial Premium fell to Mr. R. G. Hopkinson for his paper on The Photographic representation of Street Lighting Installations, and the Silver Jubilee Commemoration (1934) Award to Mr. W. R. Stevens for his Experimental Work on the Thermal Endurance of Illuminating Glassware.

New Types of Electric Discharge Lamps.

The first item on the programme was a contribution by Mr. W. J. Jones, who referred to the extensions of the work of ascertaining the illumination required by individuals for comfortable seeing. He explained that some 25,000 people had now participated in this experiment, and that 80 per cent. of them chose an illumination of 50 foot-candles or over.

Mr. Jones then proceeded to exhibit some new electric discharge lamps of great interest, which are the result of research undertaken by members of the Electric Lamp Manufacturers Association. Two models consumed respectively 80 watts and 125 watts (a marked reduction below the lowest consumption, 150 watts, hitherto provided). In appearance they closely resemble an ordinary household lamp, but the light, instead of being furnished by an incandescent filament, is emitted by an electric discharge in mercury vapour, the source of light being about half the size of a cigarette. The new lamps are stated to work at an initial efficiency of 40 lumens per watt, and an average efficiency of 30 lumens per watt, and can be used on ordinary electric circuits of 200-250 volts A.C. No step-up transformer is required, but only a small choke in series. They thus yield approximately three times as much light for a given consumption as filament lamps of similar power—a remarkable advance when it is recalled that the lamps can be inserted in most existing fittings. In addition, the colour rendering of these lamps is an improvement on that of ordinary electric discharge lamps.

Use of Fluorescent Powders.

At this stage it may be opportune to refer to the demonstration, a little later on, by Mr. H. G. Jenkins (of the G.E.C. Research Laboratories, Wembley). The device shown by him is intended to improve the colour rendering of electric discharge lamps in cases (chiefly industrial) where this appears desirable. The method consists in applying an outer jacket coated with a fine film of fluorescent powder. This leads to no loss in efficiency, the diminution in light due to absorption by the coating being counterbalanced by the gain through the conversion of ultra-violet radiation into a visible form. A better colour is, however, obtained by the use of an inner lamp, containing a little cadmium in addition to the mercury, though the luminous efficiency of such a lamp is somewhat lower than that of a lamp in a plain outer jacket containing mercury alone.

The improvement in colour that can thus be secured was illustrated by lowering an outer jacket coated with fluorescent powder over a 400 watt h.p. mercury discharge lamp. There was a manifest improvement in the apparent colour of a red cloth held near the lamp and in the appearance of the complexions of people in its vicinity.

It was also demonstrated how the same principle can be applied to modify the colour of the quartz lamps of the type demonstrated by Mr. W. J. Jones. When a series of jackets coated with different fluorescent powders was placed in succession round the lamp, pale blue, green, and orange fluorescence was exhibited. It was pointed out that in each case there was no appreciable loss in efficiency as a result of the process.

Other New Types of Electric Discharge Lamps.

Prof. Ir. G. B. Van de Werfhorst, whose display at the corresponding meeting last year excited so much interest, again presided, in conjunction with R. P. Sayers (Philips Lamps, Ltd.), over a demonstration of new lamps having interesting features. Amongst these were: (a) an 80-watt lamp, yielding 3,000 lumens operating on 220 v. with a leak transformer taking about 10 w.; (b) a similar lamp, but operating on 130 v. on choke, taking about 10 w.; (c) a similar

lamp for open circuit voltages, less than 250 v. and having a power factor of about 0.94; (d) a similar lamp, but equipped with luminescent outer jacket.

There was also on view a 1,000-watt lamp furnishing 40,000 lumens, used with leak transformer gear. A special type, having a linear source of high brightness for aerodrome lighting, can also be provided.

Finally, there were several specimens of high-pressure, water-cooled lamps. One of these, having a length between electrodes of 12 mm. and consuming 500 w. per cm. length, yielded 30,000 lumens, with a brightness of 500,000 candles per sq. cm. A second type with somewhat smaller space (10 mm.) between electrodes and operating at 850 watts per cm. length gave a lumen output of 3 x 55,000 and a brightness of 85,000 candles per sq. cm.

Stroboscopic Effects.

A feature of the display arranged by Mr. H. R. Ruff and Mr. C. W. M. Phillips (British Thomson-Houston Company, Ltd.) was the exhibition of stroboscopic effects under the light of electric discharge lamps, which had been shown on the occasion of the paper by Mr. L. J. Davies, read before the Society earlier in the year, but were repeated by special request. The changing appearance of the revolving discs under the light of the lamps and the colour-combinations was most striking. There was also exhibited a form of dark lamp furnishing ultra-violet light and adapted to the display of fluorescent effects, and an experiment illustrating the effect of different pressures in mercury lamps on the quality of light.

We may now turn to several of the earlier exhibits illustrating applications of light.

Exhibit Illustrating the British Technical Requirements for the Lighting of Aerodromes for Night Flying.

This exhibit, presented by Mr. G. H. Wilson (G.E.C. Research Laboratories), showed a model British aerodrome to a scale of 1 in 240, demonstrating the requirements for the lighting of aerodromes as laid down in British Standard Specification No. 563-1934.

The model represented an aerodrome approximately 2,000 ft. by 1,000 ft., with the limits of the landing area outlined by yellow boundary lights. A red beacon flashing a Morse character was reproduced, as well as examples of the way in which red aerodrome obstruction lights are used to indicate various types of obstruction in the neighbourhood of the landing area. A miniature illuminated wind indicator and a group of landing area floodlights were also included. The requirements made of these pieces of equipment were shown on a key chart, which gave such details as colour, dimensions, spacing, and light distribution.

A Contouring Density Comparator for Street Lighting Installations.

Mr. J. M. Waldram (Research Laboratories of the General Electric Co., Ltd., Wembley) exhibited a contouring density comparator for use in the photographic photometry of street lighting installations, etc. In this method of photometry a photograph is taken of the street surface only on a part of a plate, the sources being screened from the lens. On the reserved part of the plate the image of a neutral wedge is subsequently photographed, the brightnesses along the wedge being known. In order to determine the brightness at any part of the street surface, it is necessary to find a part of the wedge image having the same density as the image of the part of the street surface under investigations: a line drawn on the photograph of the street surface having a constant density is a line of constant brightness. The instrument described is designed for performing this operation. The plate is mounted on a horizontal carriage which can be moved in any direction but not rotated. It is moved by a pantograph mechanism, the tracing point of which moves over an enlargement made from the plate, so arranged that when the point is placed over any spot on the enlargement, the corresponding point of the plate is brought on to the axis of the instrument. A beam of light is directed upwards through the plate and is focused on to a valve photocell unit. The cell unit is connected in a bridge circuit, the galvanometer of which can be balanced at any illumination of the cell. In order to draw a contour of given brightness the pointer is brought to the appropriate point on the scale of the wedge and the galvanometer balanced. The pointer is then moved over the enlargement in such a way as to keep the galvanometer in balance, thus tracing out the required contour. The size of the beam of light can be varied from about 3 mm. to about 0.2 mm., according to the detail which it is required to investigate. An overall check of the method is arranged on each plate.

An Automatic Emergency Gas Switch.

Mr. A. R. McGibbon (Messrs. William Sugg and Co., Ltd.) demonstrated an "Automatic Emergency Gas Switch" designed to operate in conjunction with a "stand-by" gas lighting system.

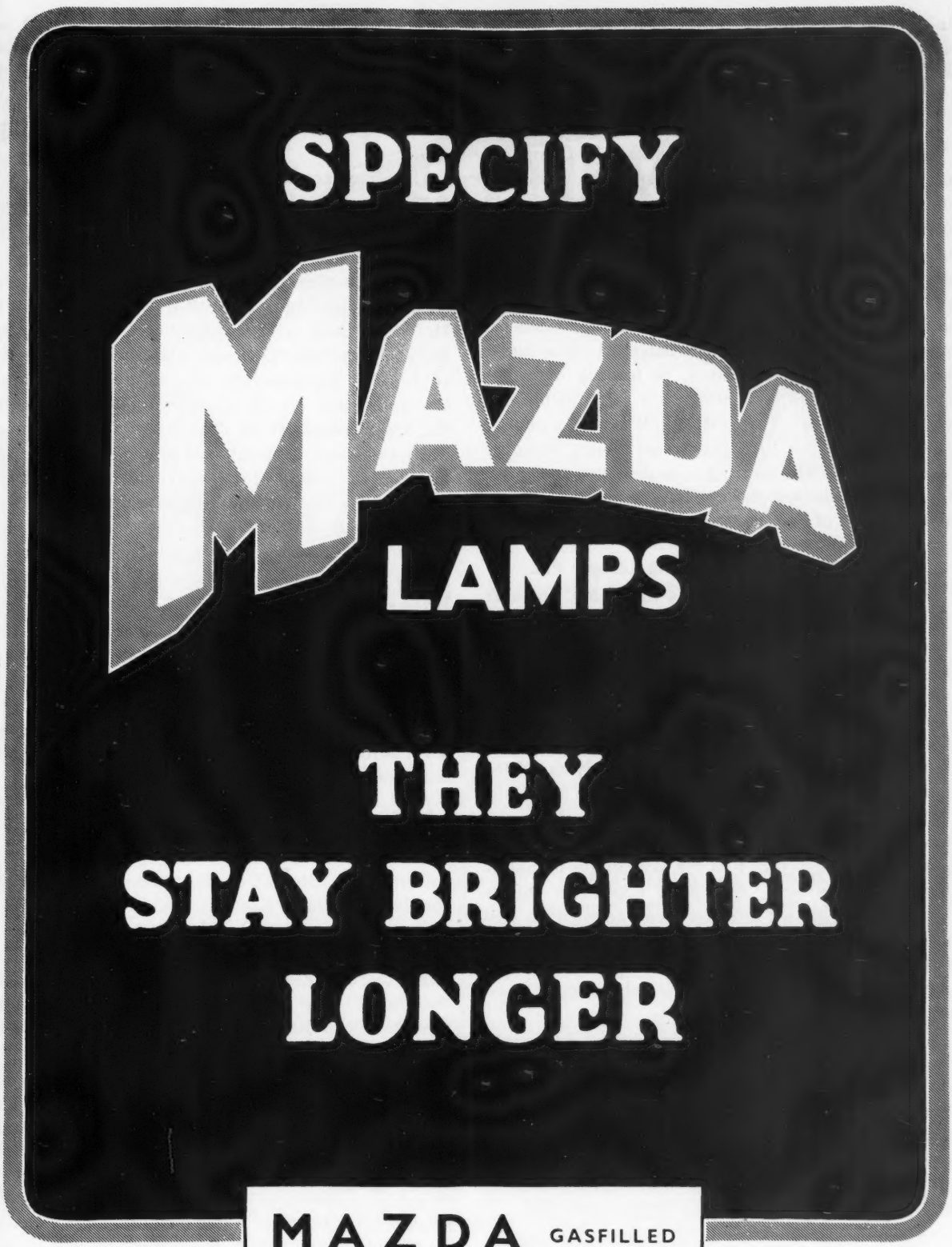
Many public buildings and important shops and stores are provided with gas lighting for emergency purposes. This automatic switch, operating in conjunction with Messrs. Sugg's distant control device, turns on the gas lighting immediately upon failure of the electricity supply.

The switch, which was demonstrated, operated a 3-light No. 2 size domestic unit, but was capable of controlling up to fifty or sixty such lamps located in various parts of a building.

To "set" the switch when the electrical circuits are alive, it is necessary only to raise the setting handle to the horizontal position and allow it freely to return. The word "set" then appears on the indicator. Similarly when the lamps are alight the indicator shows "gas on." This indication is particularly desirable when the device is fixed remote from the lights which it controls.

During the day, or at other times when the electric or gas lighting may not be required, the "switch" may be left in the "locked" position, so that it is completely out of action.

Mr. McGibbon also showed a $\frac{1}{8}$ scale model of a mirror head for photometric work. This apparatus receives light from the test lamp at any desired angle, and re-directs it axially into the photometer



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BETTER LIGHT
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MADE IN ENGLAND BY THE BRITISH THOMSON-HOUSTON CO., LTD.

head, where the candle power is measured. A full explanation of this apparatus appeared in the June issue of "Light and Lighting."

A Burner Ignited by the Catalytic Method.

Mr. K. F. Sawyer (Gas Light and Coke Company) exhibited a four-mantle burner, such as would be used in public lamps, ignited by means of a cold catalyst. The catalyst itself consists of a small pellet of platinum black supported by fine filaments of platinum in a wire framework. The catalyst is supported in a housing specially designed so that a small amount of the air-gas mixture in the superheater is passed into it from a small tube attached to the superheater. This air-gas mixture, in passing over the catalyst, is ignited, and burns as a flame at the end of the small tube. This small flame acts as a pilot in the ignition of the main gas stream issuing from the burner ports. The housing is so designed that after ignition the catalyst is kept free from contact with the products of combustion by chimney pull.

Improved Control of Public Lamps, Etc.

A variety of devices was shown by Mr. J. Baker (Horstmann Gear Company, Ltd.). Amongst these were the Horstmann Solar Compensating Dial, which enables the times of lighting and extinguishing to be varied automatically daily throughout the year, so as to conform to any desired schedule. The introduction of an improved and simplified form of dial during the past twelve months has greatly expedited development. A second novel device was the "Comet" Electric Catalytic Igniter, which eliminates by-passes. This was released to the gas industry last autumn, and has proved very acceptable to public lighting authorities. Originally applied to square lanterns, the igniter has now been adapted to suspension lamps—a development made possible by the introduction of a new type of controller, exhibited for the first time at the A.P.L.E. Exhibition at Cheltenham.

Other apparatus included emergency extinguishing devices for public street lamps (air raid valves), on which much thought has recently been devoted, and a device enabling lamps to be extinguished simultaneously in the event of an alarm operated by a decrease in pressure. Experiments with a similar valve to be operated by an increase in pressure are nearing completion.

Fluorescent Tubes.

Captain C. Higgins (Claude-General Neon Lights, Ltd.) again exhibited some of the Cleora fluorescent tubes, which had been a feature of the 1935 display. Besides typical tubes in a variety of colours, a number of special combination pieces were on view. Amongst these may be mentioned a double outline 15 mm. diameter pale "spectrum-green" tube mounted on an 18 in. metal letter with stepped edge having a yellow face, green step, and black return; double outline 15 mm. diam. white tube mounted on an 18 in. metal letter having a white concave face with gold return and a single outline 15 mm. diam. pink tube superimposed on a 19 in. anodised metal letter.

Other Exhibits.

The above account covers the series of exhibits in the first section of the programme. A fuller account of the remaining items must be deferred until next issue.

It may be mentioned, however, that amongst electric street lighting units new forms were shown by Mr. W. E. Bush (Curtis Lighting Company of Gt. Britain, Ltd.), Mr. E. Stroud (Holophane, Ltd.), Mr. G. J. Wells (Engineering and Lighting Equipment Co., Ltd.), and Mr. A. G. Brown (General Electric Co., Ltd.), whilst Mr. W. J. C. Davey (The Parkinson Stove Co., Ltd.), demonstrated some new forms of gas lamps. Horizontal (Siemens) Electric Discharge lamps and a new Horizontal Floodlight Fitting were shown by Mr. C.-R. Bicknell.

The chief items in the Photometric Section were a new Photo-Electric Daylight Factor (Mr. F. J. C. Brookes, National Physical Laboratory); a new Selective Filter for use with photo-electric cells (Mr. Ross, Weston Electrical Instrument Co., Ltd.), an Experimental Visibility Meter (Prof. G. B. Van de Werfhorst), a Colour Comparator (Mr. C. A. Morton, General Electric Co., Ltd.), and an Experimental Apparatus for the Rapid Plotting of Polar Curves (Mr. G. H. Wilson, G.E.C. Research Laboratory).

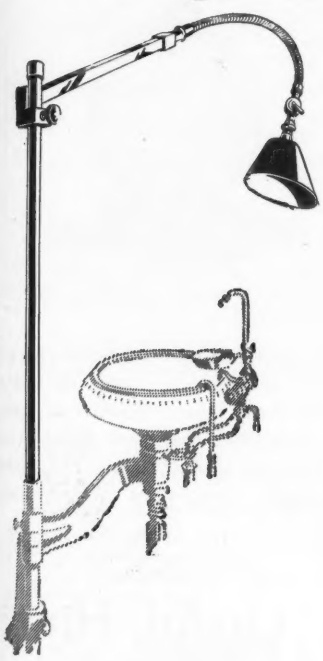
In the final section devoted to Miscellaneous Fittings, there were many different items. Glassteel diffusers, biflectors, and other special units were shown by Mr. Studholme, Mr. Lavery and Mr. Imrie Smith (Benjamin Electric, Ltd.); new floodlight units and ceiling units by Mr. E. Stroud (Holophane, Ltd.), and a new spotlight lantern by Mr. F. P. Bentham (Strand Electric and Engineering Co., Ltd.). Mr. Harold Bright was responsible for several novel devices, including a bedside lamp which automatically lighted up if accidentally "jogged"; Mr. C. Harvey showed a pleasing form of Indirect Fitting installed at the R.I.B.A., and Mr. R. R. J. N. Sandford a new and interesting G.E.C. design of Hospital Operating Theatre Fitting. The General Electric Co., Ltd., were, in the persons of Mr. S. Anderson, Mr. J. G. Christopher, and Mr. J. New, responsible for quite a number of other novel fittings, including an automatic flameproof unit for use at coal faces.

Amongst other special exhibits we may note the new "Truvex" lenses for use in lanterns and film projectors exhibited by Chance Bros. and Co., the model Theatre Stage prepared by Mr. R. R. Holmes, a new hand-lamp operated by vaporised oil, shown by the Tilley Lamp Company, and a display of photographs illustrating Mr. Hopkinson's method of getting accurate records of street lighting installations.

(*To be continued.*)

TRADE NOTES AND NEWS

A Light for Dentists



Visitors to the dentist must often have been struck by the importance he attaches to the light—good, natural light, if possible. Here, however, is a convenient form of Typerlite fitting to answer his need of supplementary artificial light. It has all the necessary requirements as regards flexibility—a quality which is well illustrated in the latest Typerlite catalogue, where local units to satisfy almost every conceivable need are to be found.

The Science of Seeing

A booklet issued by the Lighting Service Bureau of Dublin strikes us as one of the best productions of this kind we have seen for some time. To begin with, the paper, free from glaze, is agreeable to the eyes. Black and white or line illustrations are mainly used, but several half-tones are well rendered—rather an achievement on this kind of paper. Many of the pictures are ingenious and effective (we like the two of the gentleman in bed). The figures for the percentages of defective vision amongst persons having different occupations are interesting and seem to confirm the effects of constant close work. There are also data for various Irish counties. Why, one wonders, do Co. Wicklow and Co. Galway show up so well with only 8-9 per cent. of defective vision, whilst Co. Carlow shows as much as 41.7 per cent.! We are glad to see that, in an appendix, the main values in the Recommendations of the Illuminating Engineering Society are set out.

Contracts Closed

EDISON SWAN ELECTRIC CO., LTD.

London, Midland and Scottish Railway—For Royal Ediswan lamps for the three years ending July 31, 1939.

SIEMENS ELECTRIC LAMPS AND SUPPLIES, LTD.

London County Council—For the supply of Siemens electric lamps of all types for a further twelve months.

Architectural Lighting

Our treatment of this subject has been somewhat held up by the demands of street lighting and other subject matter, but we hope to deal specially with it in the next issue, and, when doing so, to include one or two pictures of pleasing "Maxtrip" installations, which Straight-Lite Reflectors, Ltd. have sent us. Those dealing with Derry and Toms are particularly interesting.

Electric Light Fittings Association

5 per cent. Increase in Prices

At a recent meeting of the Decorative Section of the above association, a resolution that list prices be increased by 5 per cent. on all lighting fixtures (including glass component parts), with certain exceptions relating to industrial fittings, was passed. This increase, to which a number of outside firms have agreed, has been necessitated by additional costs of labour and material, and came into operation on October 1.

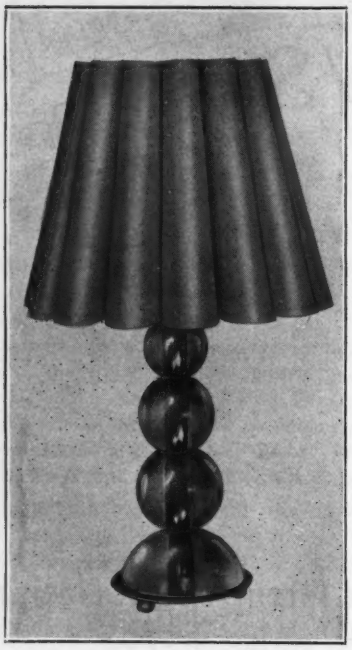
Christmas Tree Outfits

A timely announcement by the General Electric Co., Ltd., relates to the Osram Christmas Tree Outfit, which is conveniently assembled with small coloured bulbs, holders, flex, and adapter complete, for the modest price of half a guinea.

A Hailware Showroom

The illustration above shows the large and attractive showroom of Hailware and Ackroyd Ltd. at 71-75 New Oxford-street, London. The picture only shows one corner of the ground floor, but gives an idea of the considerable stock carried, which is entirely British made.

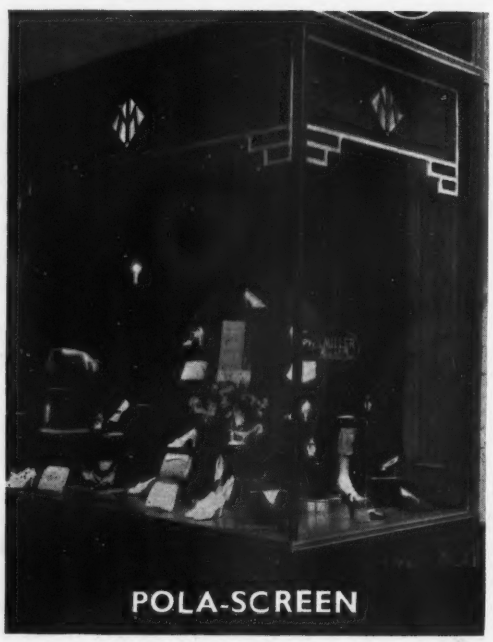
Modern Designs of Portable Lamps



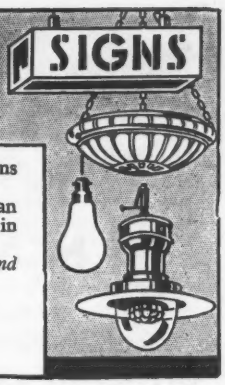
How greatly variety of design in connection with portable table lamps and the like has developed during recent years! At one time all were made to a conventional type, to-day there are endless variations—even apart from the more "futuristic" designs which depart widely from traditional methods. We illustrate above three typical modern designs, to be seen in the showrooms of L. G. Hawkins and Co. Ltd. (Drury Lane). In two of these glass takes the place of metal for the support—a popular form being the coiled snakelike one shown in the central illustration. The third design, on the right, shows a figure poised upon a luminous sphere, a departure which is mainly decorative in intention.

Photographing Show Windows: A Useful Hint

We referred recently to the new "Pola" screens introduced by Kodak Ltd. (*July*, 1936, p.200). These seem likely to prove a useful aid to the photographer—especially in taking views by artificial light, which are liable to be marred by reflections of lamps and other bright objects Such reflections consist largely of polarised light and can therefore be suppressed by the use of "Pola" screens. The two views of a shopwindow below are self-explanatory.



·WHERE TO BUY·
A DIRECTORY OF LIGHTING EQUIPMENT



We invite applications for spaces in this new section of the journal. Particulars of terms for each space (approx. 1 inch deep and 3¼ inches wide) are given below.

These terms are equivalent to half our ordinary advertising rates, but not less than 12 successive monthly insertions can be accepted on this basis, and amounts are payable in advance.

Payment for an advertisement in this section entitles the advertiser to receive *Light and Lighting* during the period of the contract.

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1

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for all requirements

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PLEASE send for Detailed list of Books on Illuminating Engineering and allied subjects, post free, from:

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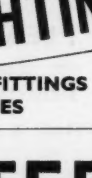

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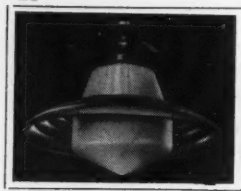

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Catalogues and Advertising Literature

We invite all firms in the Lighting Industry to send us new catalogues as they appear, for reference in these columns.

ALLOM BROTHERS, LTD.—Catalogue Sheets showing new forms of Pendants, Pedestal Lights and Wall Brackets of graceful design.

THE AMPLILUX LIGHTING & ILLUMINATION CO., LTD.—Leaflet describing a simple device based on the use of a Prismatic Ring, and other more elaborate Lighting Units.

BENJAMIN ELECTRIC, LTD.—"The Reflector," Vol. 36, No. 2, an illustrated booklet featuring "Light Aid for Night Sports," various Industrial Lighting Features, etc.

THE BRITISH THOMSON-HOUSTON CO., LTD.—Mazda Micky Mouse Lights, appear in a highly original production in colour, featuring the goods of various firms.

THE CURTIS LIGHTING COMPANY OF GREAT BRITAIN, LTD.—Catalogue (No. 136) of modern Reflectors, Projectors, and Luminaires.

FALK STADELMANN & CO., LTD.—List (No. 724) showing a variety of novel forms of Table Standards, etc.

FRANCO BRITISH ELECTRICAL CO., LTD.—A leaflet illustrating Lighting with Fluorescent Gaseous Discharge Tubes and a catalogue illustrating Modern Signs, including Animated Neon, etc.; executed in colour with striking pictures of Architectural and Decorative Lighting Installations.

KANDEM ELECTRICAL, LTD.—Leaflet featuring Anti-Glare Enclosed Fittings.

KLIEGL BROS. (New York).—Forty Years of Kliegl Lighting. A catalogue featuring Stage Lighting and illustrating a wide range of Equipment.

THE MORTIMER GALL ELECTRICAL CENTRE.—"Light and Heat," an original and fully illustrated leaflet emphasising the advantages of modern Heating and Lighting.

PHILIPS LAMPS, LTD.—"Accidents Caused by Bad Visibility," an effective leaflet dwelling on the prevalence of street accidents and presenting a striking picture (executed in yellow and black) of a Philora Sodium Lamp Installation.

SIEMENS ELECTRIC LAMPS AND SUPPLIES, LTD.—Catalogue of Modern Lighting Fittings.

FREDK. THOMAS & CO., LTD.—Catalogue of Modern Lighting Fittings.

THE TYPERLITE COMPANY.—An illustrated catalogue showing the variety of Typerlite Adjustable Fittings and their Applications for Local Lighting.

WARDLE ENGINEERING CO., LTD.—A series of catalogues illustrating Street and Industrial Lighting Equipment, Decorative Glassware, etc. The Street Lighting catalogue contains effective pictures of Sodium Installations, and the list of Wardle Glassware Units contains some colour insets.

The Engineering Institute of Canada Fiftieth Anniversary Meeting

The above meeting, to be held in Montreal on June 15, 1937, should be the means of bringing about a closer acquaintanceship between engineers of Great Britain and Canada. The gathering should be an enjoyable one. Any members of the Illuminating Engineering Society who are interested should get in touch with the Headquarters of the Institute at 2050, Mansfield-street, Montreal, Canada.

SIMPLEX

Industrial, Commercial & Street Lighting Shopwindow

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"LUX"
(La Revue de l'Eclairage)

WE have pleasure in announcing to our readers that we have entered into an arrangement to receive subscriptions for the French Journal "Lux" (La Revue de l'Eclairage). The subscription per annum is 30 francs, the approximate equivalent of which in English money is Seven Shillings and Sixpence (7/6).

"Lux" is the only French journal which specialises in all aspects of lighting; it is the official organ of the Association Française des Ingenieurs de l'Eclairage (equivalent to the Illuminating Engineering Society in France).

It furnishes a complete record of interesting developments in lighting in France and on the Continent. It is fully illustrated and in particular devotes a considerable number of its pages to Decorative Lighting.

By studying these articles and the numerous photographic reproductions of modern lighting installations the reader can readily gain an excellent impression of French methods and practice in matters of Illumination.

Applications for subscriptions will be received by "Light and Lighting," 32, Victoria Street, London. S.W.1.

THE ELEMENTS OF GOOD LIGHTING

WHY AN UP-TO-DATE PRINTER CHOOSES GAS

There are still many people who associate gas lighting with antimacassars and aspidistras and do not realise that it has made as much progress as other forms of lighting. It may, therefore, come as somewhat of a surprise to such people to find such progressive printers as Messrs. George Reveirs, Ltd., choosing gas lighting for their new works at Rosebery-avenue, E.C.1, after going very thoroughly into the matter.

It should not be surprising, when it is remembered that the principal streets of Westminster, including Whitehall, are lit by gas. Observant people, especially motorists, comment upon these streets as the best lit in London.

Let us consider these advantages that induced Messrs. George Reveirs, Ltd., to adopt gas lighting.

It's real light that matters

The amount of real visibility given by a lamp depends not only on the candle power of that lamp but also on the colour properties of the light, on the absence of glare and on its diffusive power. In other words, the nearer we get to daylight the better. The ordinary incandescent gas mantle gives light which approximates more nearly to daylight than any other commercial artificial illuminant. It shows things up in their true colours and reduces eyestrain. By using "daylight" mantles an even nearer approach to natural daylight is achieved.

The source of brilliance in gas lighting is so large that glare is almost entirely absent. During the floodlighting display in London everybody remarked upon the beautiful soft, diffused light given by the gas floodlighting.

Reliability

Another important consideration is reliability. Gas lighting has never been known to fail. Therefore expensive emergency lighting installations are quite unnecessary. A district "black-out" can be, and has been, a cause of serious loss and disorganisation to printers and newspapers.

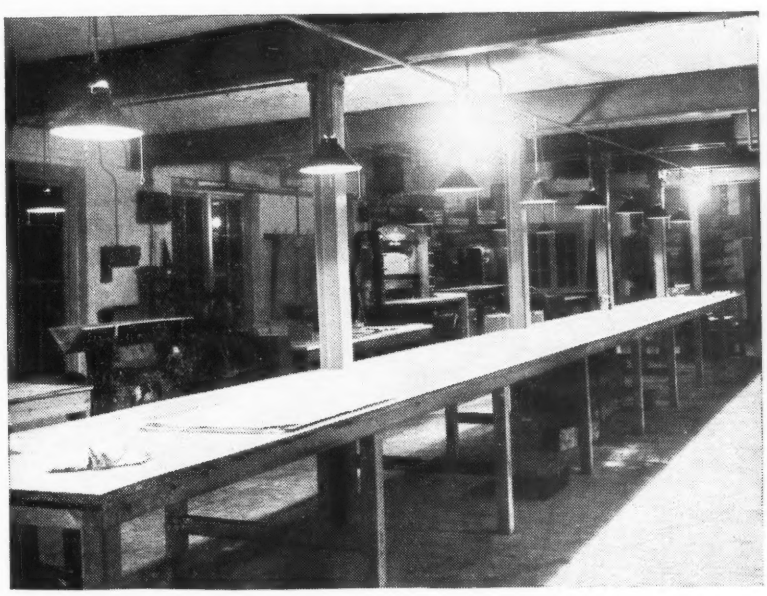
As for convenience, catalytic control has given the gas lamp the wall switch so that it can be lit in an instant from the doorway of the room, or other convenient point of control.

Then comes the question of cost, and here again gas scores heavily For a similar amount of effective illumination gas is cheaper than other illuminants, or, alternatively, for a given expenditure a larger amount of effective illumination can be produced by gas than by any other means, a point of some importance in view of the tendency towards higher illumination values. Then again, gas mantles cost less, they last longer, and their depreciation in candle power is almost negligible.

Gas lighting assists heating

Another factor to be considered when comparing cost is the appreciable amount of warmth given by gas lamps. This saves on the heating fuel bill, and Messrs. George Reveirs find that the gas lighting gives sufficient warmth in spring and autumn to obviate the necessity of running the central-heating plant. This heat is used on some machines to dry the sheets as they are passed out.

These considerations show that there is a very strong case for gas lighting, and anyone in the position of choosing the lighting for a building would do well to obtain expert advice on the subject. This can be obtained by writing to the British Commercial Gas Association, at Gas Industry House, 1, Grosvenor-place, London, S.W.1, who will provide the information or put the enquirer in touch with the body best equipped to assist him. [ADVT.



Gas lighting in the binding and folding room of a modern printing works.

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and

POOLS OF LIGHT

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